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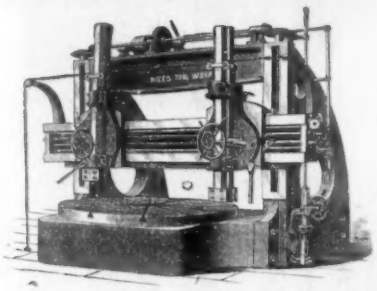

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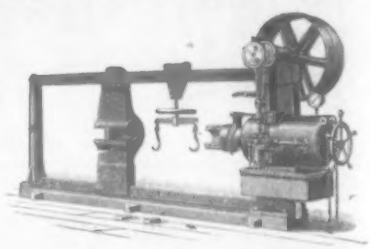

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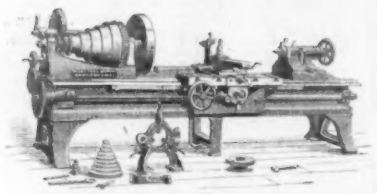

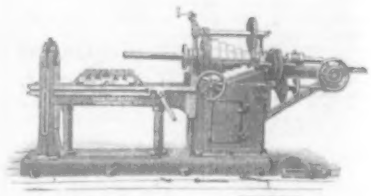

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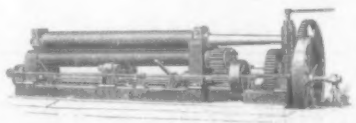

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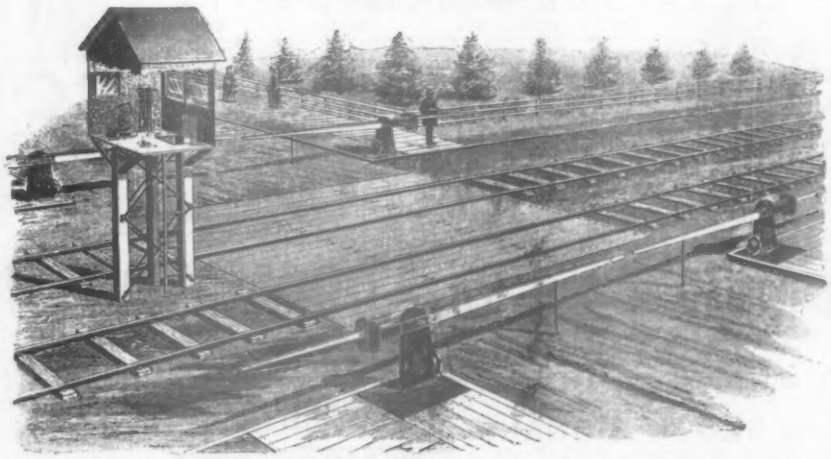

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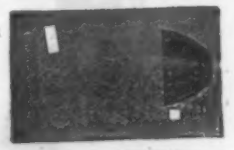

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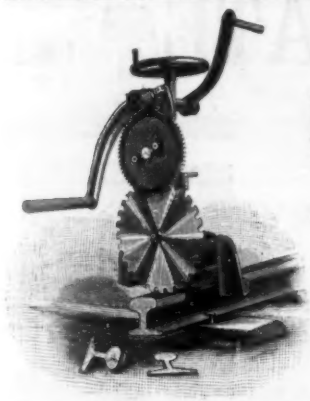

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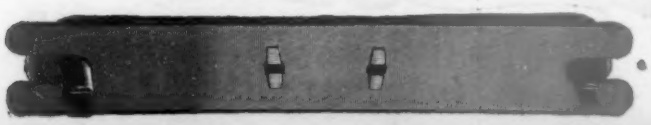

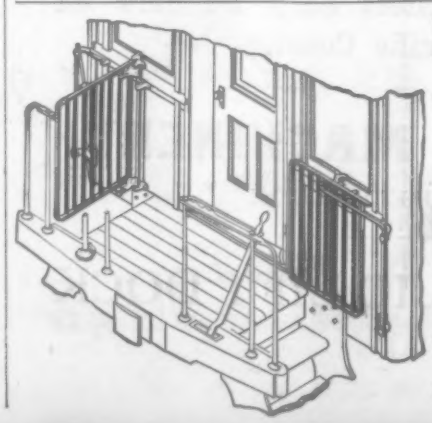

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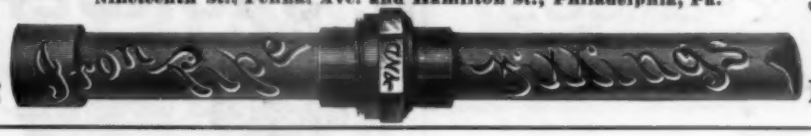

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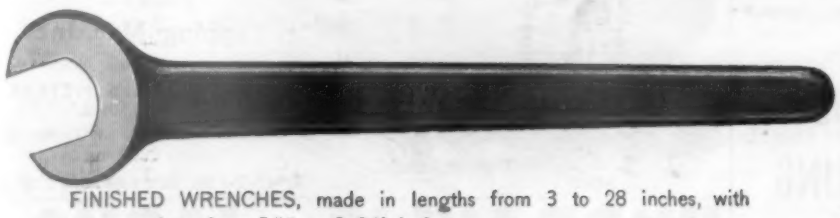

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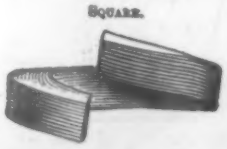

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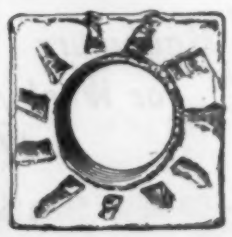

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Our claim for this lock, aside from the unexcelled spring quality it possesses (being tempered in oil) is the tangential cutting or ratchet ribs on either side, and reversed, so that when the nut is set down these ribs are embedded in both fish plate and under face of nut to such extent that a removal of the nut by force (and it can only be done with force) will show annular grooves plowed on surface of both nut and fish plate (see cuts above) without disturbing the thread of either nut or bolt, both of which, together with the nut lock, can be used again. This is a positive lock, with spring temper, and will not cut thread of nut or bolt.

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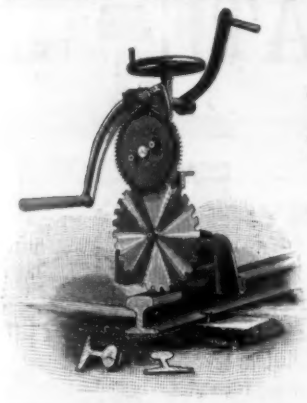

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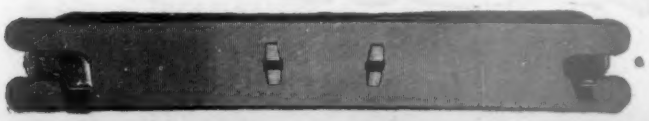

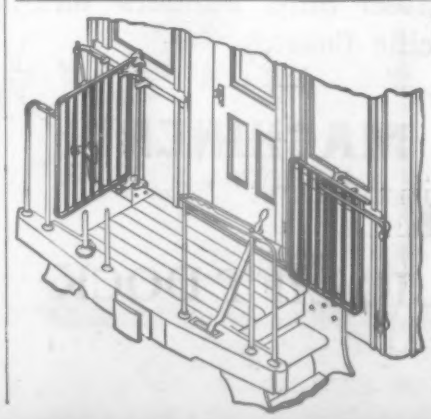

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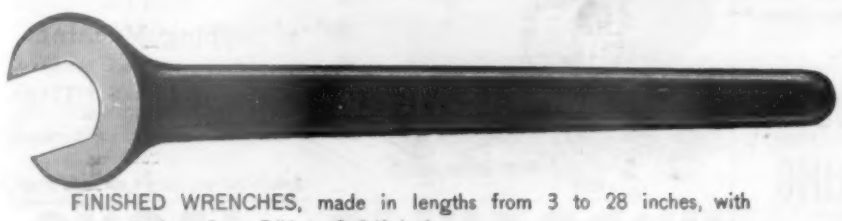

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Dilworth, Porter & Co., Pittsburgh, Pa.
Q. & C. Co., Chicago.
Morris Sellers & Co., Chicago.

Springs
Farist Steel Co., Bridgeport, Conn.
A. French Spring Co., Pittsburgh, Pa.
Pickering Spring Co., Philadelphia.
Chas. Scott Spring Co., Philadelphia, Pa.

Stand Pipes
John N. Poage, Cincinnati, O.
King Bridge Co., Cleveland, O.
Sheffield Veloc. Car Co., Three Rivers, Mich.

Staybolt Iron
Falls Hollow Staybolt Co., Cuyahoga Falls, O.
Fuller Bros. Co., N. Y.
R. M. Jones & Co., Boston & N. Y.

Steam Coupling
Moran Flex. Steam Joint Co., Louisville, Ky.

Steam Dredges
Bucyrus (O.) St'm Shovel & Dredge Co

Steel Car Channels
Cambria Iron Co., Johnstown, Pa.

Steel—Musket's
R. M. Jones & Co., 11 Oliver St., Boston.

Steel Castings
Chester Steel Castings Co., Philad'a., Pa.
Eureka Cast Steel Co., Philad'a, Pa.
Norristown Steel Co., Norristown, Pa.
Sharon Steel Castings Co., Sharon, Pa.
Solid Steel Co., Alliance, O.
Pratt & Letchworth, Buffalo, N. Y.

Steel Centre Plates
Schoen Mfg. Co., Pittsburgh, Pa.

Steel and Iron Plates
Lukens Iron & Steel Co., Coatesville, Pa.

Steel and Steel Tires
Latrobe Steel Works, Latrobe, Pa.
Midvale Steel Co., Nicetown, Phila.
Thos. Prosser & Son, 15 Gold St., N. Y.
Standard Steel Works, Philadelphia, Pa.

Storage of Ry. Equipment
New Jersey Car Storage & Repair Co., Lake View, N. J.

Switches and Switch Stands
Allentown Rolling Mill, Allentown, Pa.
Elliott Frog & Switch Co., E. St. Louis, Ill.
Johnston R. R. Frog & Switch Co.
Kelsey R. R. Signal Co., Florence, Mass.
Nat. Switch & Signal Co., So. Bethlehem, Pa.
Pennsylvania Steel Co., Steelton, Pa.
Ramapo Iron Works, Ramapo, N. Y.
Sheffield Veloc. Car Co., Three Rivers, Mich.
Union Switch & Sig. Co., Pittsburgh, Pa.
Weir Frog Co., Cincinnati, O.

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G. I. Burkhardt's Sons, Philadelphia, Pa.
Fairbanks, Morse & Co., Chicago.

Tank Valves
John N. Poage, Cincinnati, O.

Taps and Dies
D. Saunders' Sons, Yonkers, N. Y.
Manning, Maxwell & Moore, 111 Lib. St., N. Y.

Testing Laboratory
Pitts. Testing Laboratory, Pittsburgh, Pa.

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Electric Secret Service Co., N. Y. City.
Gill-Alexander Electric Mfg. Co., Kansas City, Mo.

Thermometers
Standard Therm. Co., Peabody, Mass.

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Q. & C. Co., Chicago.
Shoulder Tie Plate Co., Philadelphia, Pa.

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Metcalf, Paul & Co., Pittsburgh, Pa.

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Industrial Works, Bay City, Mich.

Turn Buckles
Cleveland City Forge & Iron Co., Cleveland, O.

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Cofrode & Saylor, Philadelphia, Pa.
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A. S. Males & Co., Cincinnati.
Passaic Rolling Mill Co., Paterson, N. J.
Wm. Sellers & Co., Phila. and N. Y.
Shiffer Bridge Co., Pittsburgh, Pa.

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Curtis Regulator Co., Boston, Mass.
Mason Regulator Co., Boston, Mass.
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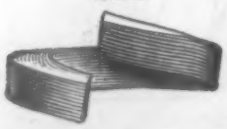

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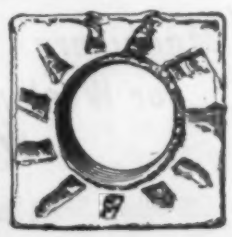
A Resilient Spiral Spring Washer with Rachet-Shaped Teeth.



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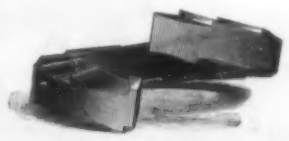

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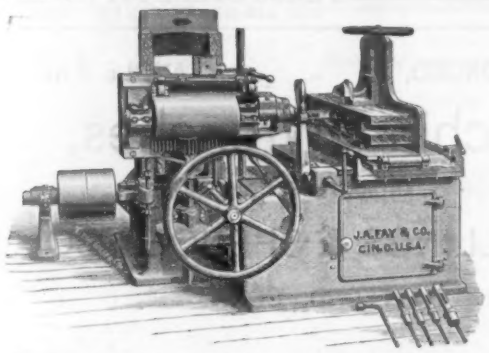

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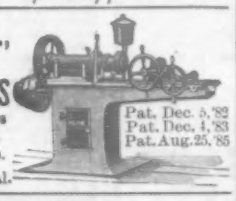

Pat. Dec. 5, '82
Pat. Dec. 4, '83
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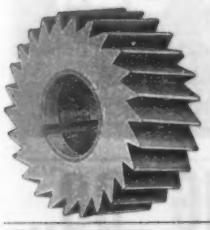

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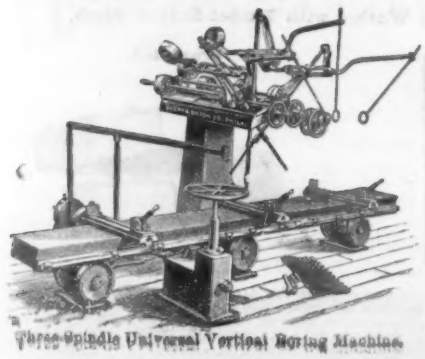

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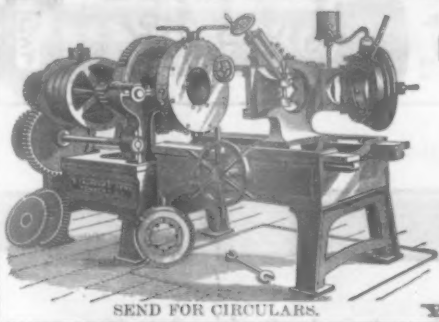

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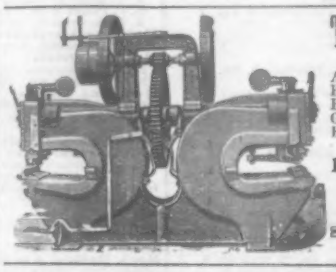

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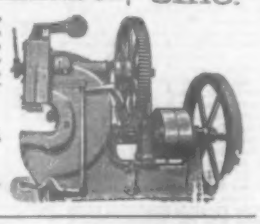

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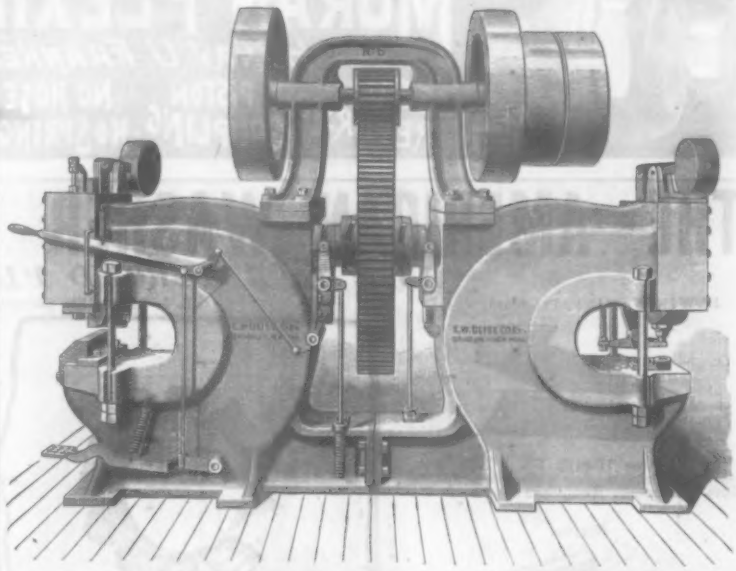

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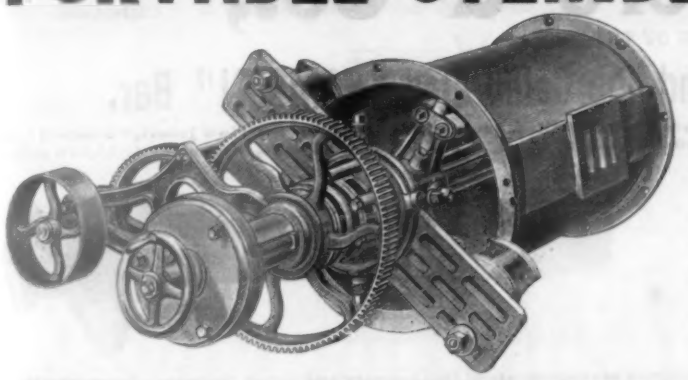

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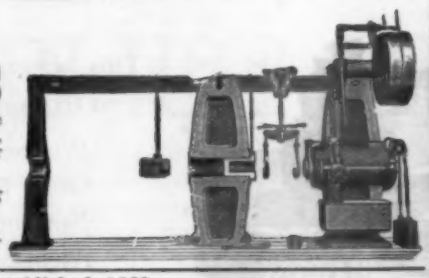

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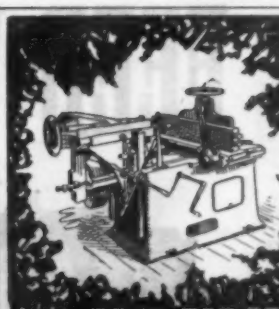

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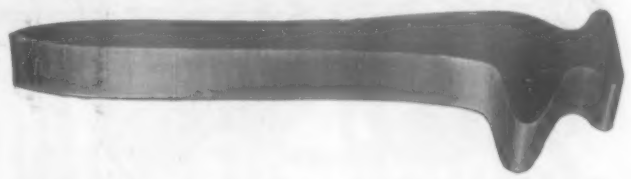

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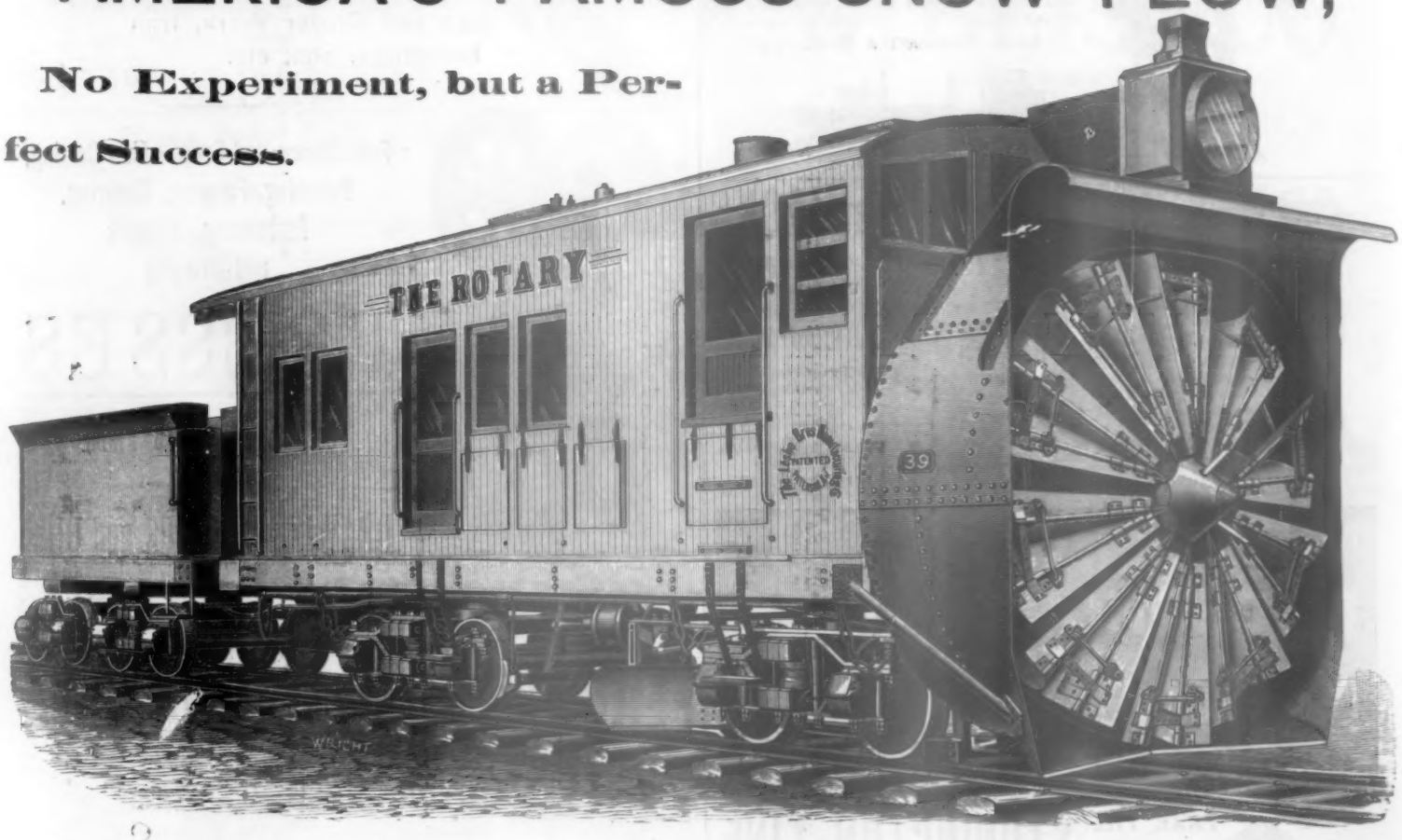

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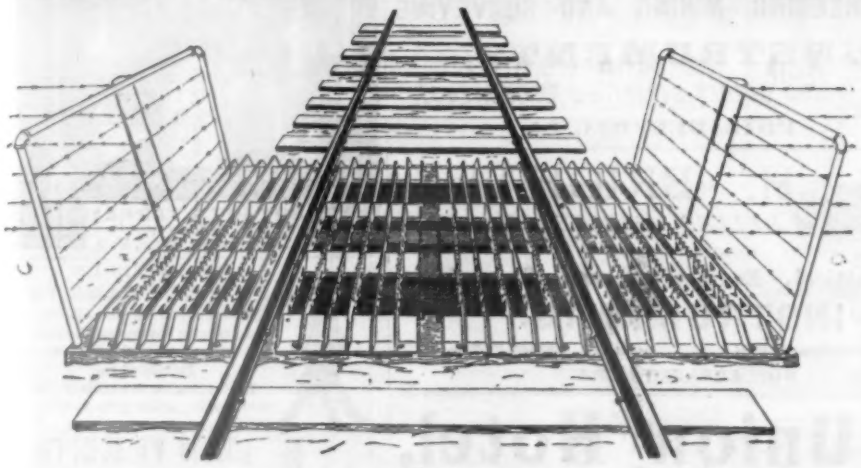

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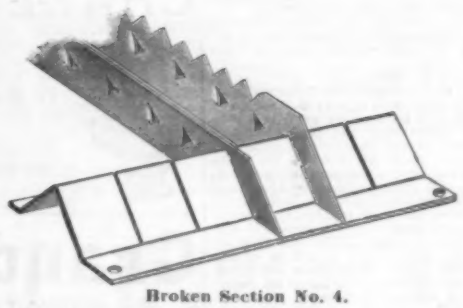

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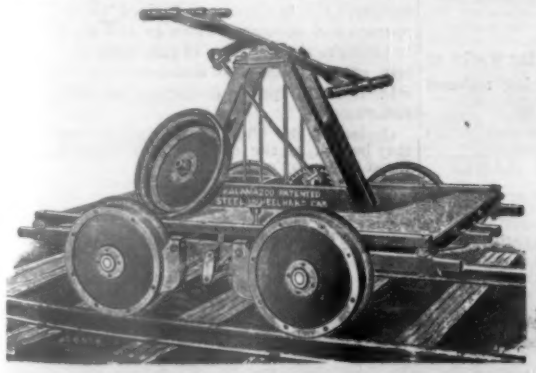

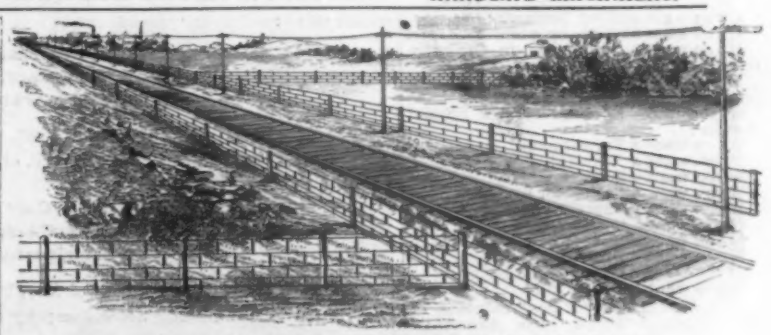

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THE SANITARY DISTRICT OF CHICAGO.

TO CONTRACTORS.

Sealed proposals addressed to the Board of Trustees of the Sanitary District of Chicago and indorsed:

PROPOSALS FOR EXCAVATING THE MAIN DRAINAGE CHANNEL will be received by the clerk of the said Sanitary District at Room H Rialto Building, Chicago, Ill., until 12 m. (standard time) of Wednesday, the 8th day of June, 1892, and will be publicly opened by the said Board of Trustees at the regular meeting held that day, or at a special meeting called for that purpose.

The work for which the said tenders are invited is the excavation of the main drainage channel for the said Sanitary District between Willow Springs and Joliet, Ill., and consists in all of about 11,500,000 cubic yards of rock, of about 5,000,000 cubic yards of earth, the building of 287,241 cubic yards of dry rubble walls, and 244,444 square yards of slope paving.

Bids will be received on three different propositions, designated as "Proposition 1," "Proposition 2," and "Proposition 3," respectively,

As provided under the different propositions said work will be divided into 14 to 17 sections, each of which will be treated as a separate contract in canvassing the proposals and making awards, except as otherwise provided in Proposition 3. As all awards will be made by individual sections or a group of sections, as provided in the specifications and forms of proposals to be furnished bidders, each bidder must make prices for each section, or a group of sections, as the case may be, separate and distinct from every other. The jumping of prices in any bid other than as given in the form of proposal under Proposition 3 will render such bid informal and will cause its rejection by the said Board of Trustees.

As the question of which proposition will be acted upon will not be determined by the Board of Trustees until after the time set for receiving proposals the bidder is allowed to make three alternative tenders based upon the terms of the specification for each of the three propositions respectively.

Each proposal must be accompanied by a certified check or cash to an amount equal to $3,000 multiplied by the number of sections bid upon, whether said sections stand singly or in a group. Provided, that the said check or cash shall entitle the bidder to make tender under any or all three of the said propositions.

All certified checks must be drawn on some responsible bank doing business in the city of Chicago and be made payable to the order of the Clerk of the Sanitary District of Chicago. Said amount of $3,000 for each section will be held by the Sanitary District until all of said proposals have been canvassed and contracts awarded and signed, the return of said check or cash being conditioned upon any bidder to whom an award of any portion of said work may be made appearing within 10 days after notice of such award being given, with bondsmen, and executing a contract with the Sanitary District for the section or sections of said work so awarded, and giving a bond satisfactory to the said Board of Trustees for the fulfillment of the same in the amount of $100,000 for each section of work awarded him, whether said sections be awarded singly or in a group.

All proposals must be made on blank forms furnished by the Sanitary District, and must give the price for each separate item of work. A form will be furnished for each of the three propositions.

The bids will be compared on the basis of the engineer's approximate estimate of quantities, which will be furnished with copies of the specifications.

No proposal will be considered unless the party making it shall furnish evidence satisfactory to the Board of Trustees of his ability to do the work and that he has the necessary pecuniary resources to fulfill the conditions of the contract, provided such contract shall be awarded him.

Bidders are required to state in their proposals their individual names and places of residence in full.

Specifications may be had and plans may be seen at the office of the Chief Engineer, Room E Rialto Building, Chicago, Ill.

The said Board of Trustees reserve the right to reject any and all bids.

THE SANITARY DISTRICT OF CHICAGO,
By FRANK WENTER,
President of its Board of Trustees.

Attest:
THOMAS F. JUDGE, Clerk.
Chicago, Ill., April 7, 1892

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Auction Sale of Railroad Cars and Locomotives.

NOTICE IS HEREBY GIVEN that in pursuance of an order of the Circuit Court of the United States for the Southern District of New York, made and entered upon on the fourth day of April, 1892, I, the undersigned, William C. Lane, Receiver of the property of the United States Rolling Stock Company, will sell at public auction, for cash, at the works of the United States Rolling Stock Company at Hegewisch, Ill., upon the 25th day of April, 1892, at 12 o'clock, noon, the following described rolling stock:

45 Box Cars,
107 Stock Cars,
6 Flat Cars,
80 Coal Cars,
24 Refrigerator Cars, and
2 Locomotives.

On Thursday, the 28th day of April, 1892, at 12 o'clock, noon, at the works of the United States Rolling Stock Company, at Decatur, Ala., the following railroad rolling stock:

50 Condolas,
3 Box Cars,
28 Refrigerator Cars.

And on Saturday, the 30th day of April, 1892, at the works of the United States Rolling Stock Company at Anniston, Ala., at 12 o'clock noon, the following railroad rolling stock:

32 Flat Cars,
8 Box Cars,
9 Refrigerator Cars.

And on Wednesday, the 4th day of May, 1892, at 12 o'clock noon, at the works of the United States Rolling Stock Company at Urbana, O., the following railroad rolling stock:

1 Refrigerator Car,
12 Box Cars,
11 Flat Cars,
20 Stock Cars.

And on Friday, the 6th day of May, 1892, at 12 o'clock noon, in the yards of the Pennsylvania Railroad Company, at Harrisburg, Pa.,

15 Refrigerator Cars.

WM. C. LANE,
RECEIVER.

Dated April 4th, 1892.

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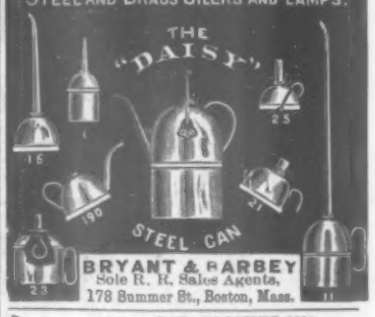

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NOTICE.

The time for the deposit of all Terminal securities and all classes of stocks is extended until and including Monday, May 2, 1892.

The time for the deposit of all underlying bonds is extended until and including Friday, May 6, 1892.

After the Dates Above Named Stocks and Securities Will Be Received Only Upon Such Terms as the Committee May Then Impose.

The right of subscription to the Cash Fund, offered under the plan to the depositories of stock and 5 per cent. bonds, will be extended to such date as may be hereafter advertised by the committee.

The holders of the securities of the auxiliary corporations are invited to co-operate and become parties to the Plan to preserve the integrity of this large system of railroads, the disintegration of which would prove disastrous to such securities.

Copies of the Plan of Reorganization may be had at the office of the Central Trust Company of New York.

NEW YORK, April 19, 1892.

FREDERIC P. OLCOTT,
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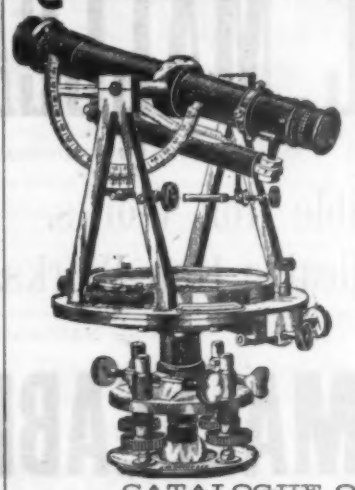

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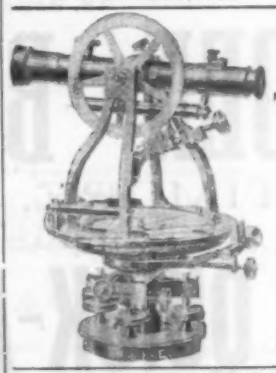

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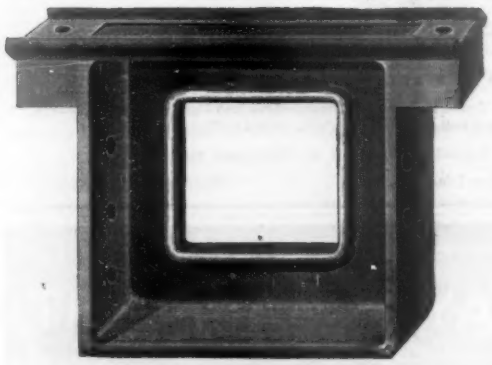

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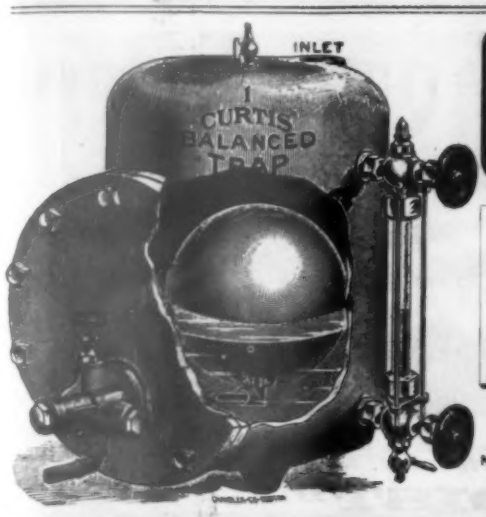

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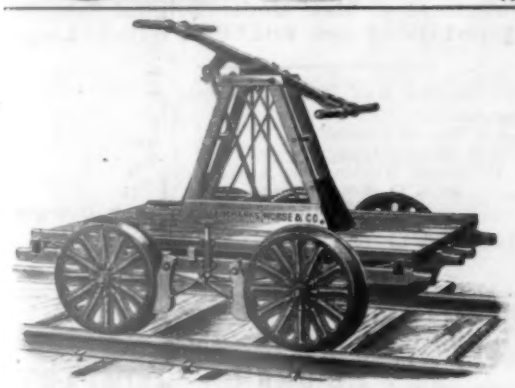

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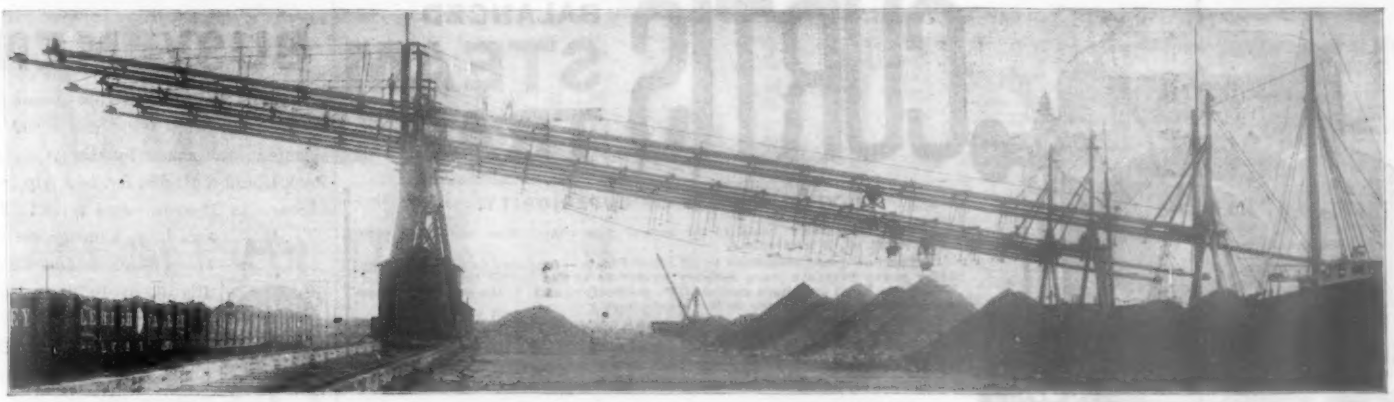

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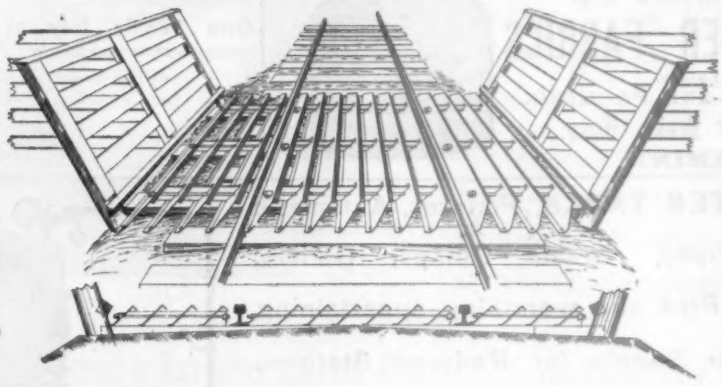

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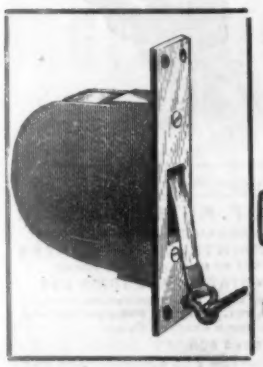

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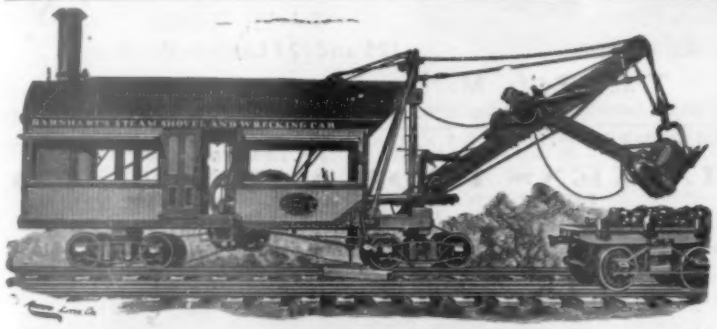

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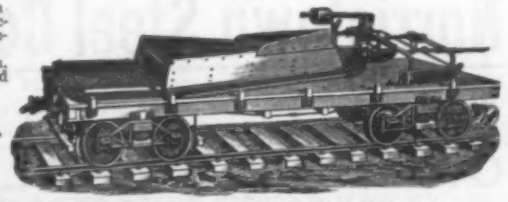

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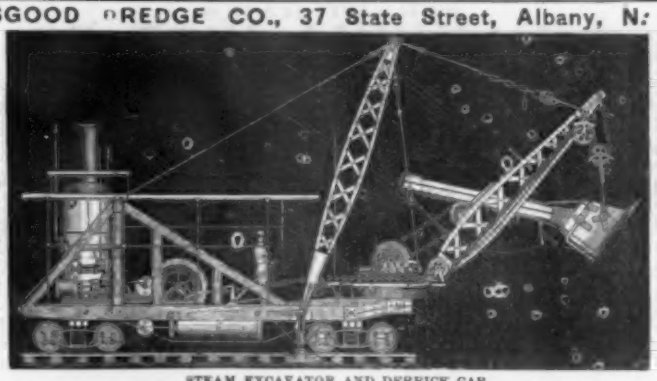

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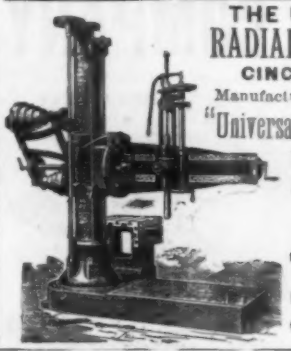

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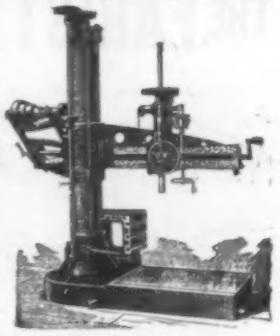

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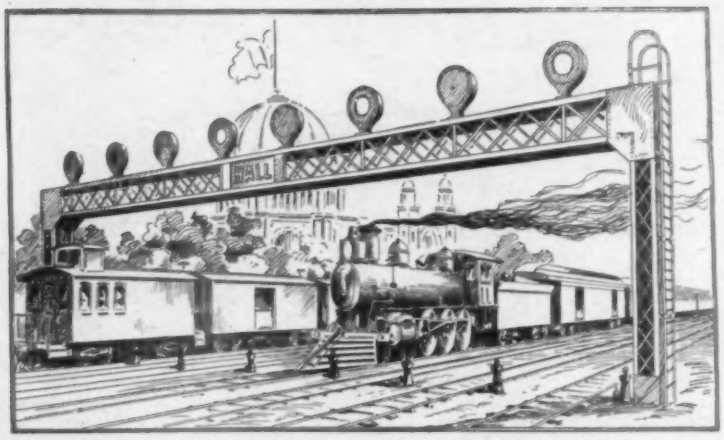

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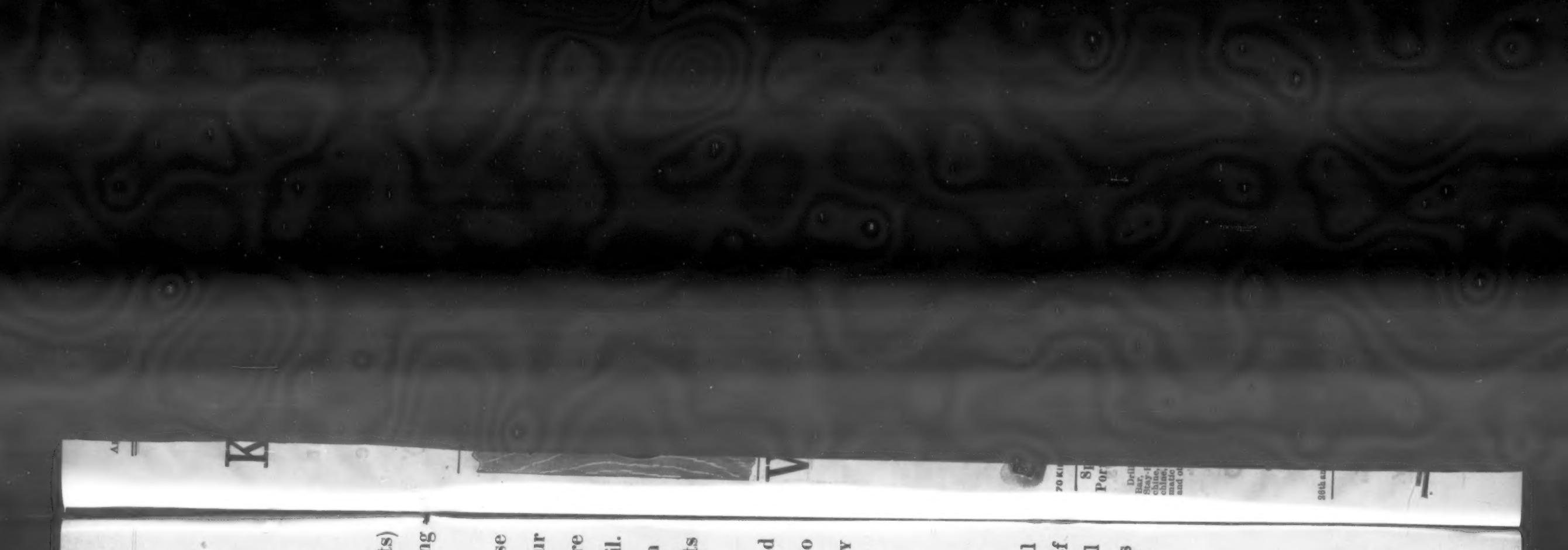

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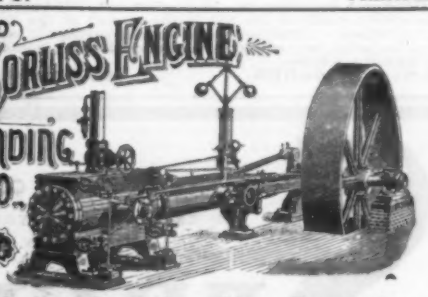

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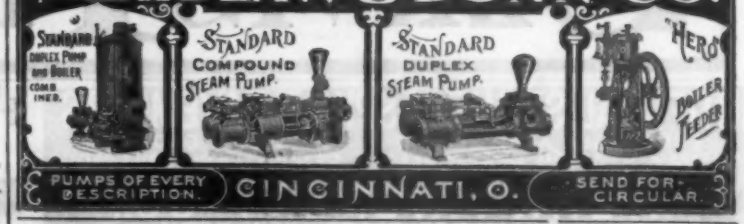

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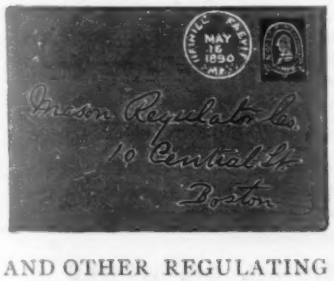

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RAILROAD GAZETTE

FRIDAY, APRIL 22.

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Contributions.

Unlocking M. C. B. Couplers.

CHICAGO, April 2, 1892.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In a recent issue of your paper a correspondent, writing on the subject of M. C. B. coupler and the proposed legislation, takes a position on which some comment would seem to be necessary. He says:

"It is also necessary with the M. C. B. couplers most generally in use to go between the cars to open one knuckle when two of them are approaching each other and both of the mare closed, and this is the only occasion the brakemen have to go between the cars with this type when coupling to itself; *and as the number increases the occasions even for this will grow less very fast, because one knuckle is always left open when they are uncoupled.*"

This statement is true only within very narrow limits. It is true that the occasions will grow less very fast, but he does not state the fact that these occasions can never be reduced below 50 per cent.; that even if all cars were equipped with vertical plane couplers, and that even if "one knuckle is always left open when they are uncoupled," the fact remains that when two cars approach one another for coupling the chances are just even that both knuckles will be closed. Unless there is a knuckle opening device, the trainmen must go between the cars and apply the hand to open the knuckle. Therefore, the necessity of a knuckle-opening device becomes apparent. A trainman applying the hand to the knuckle occupies a dangerous position. If the removal of that hazard be made compulsory by any law that is passed on this subject, it will be removed. Simplicity in the design of the coupler is to the highest extent desirable, but there are couplers in the market which have proved their entire efficiency by continuous service on many roads, the knuckles of which can be opened from the side of the car by a positive motion without any sacrifice of either simplicity, fewness of parts, or strength.

The suggestion contained in the article referred to: "To add a clause to any law that may be passed making it illegal for the trainmen to go between the cars equipped with M. C. B. coupler while either portion of the train is in motion" savors much of Artemus Ward's story of the death of his old deaf father-in-law: "He was walking on the track and was run over by a train, but he needn't have been, for the kind-hearted engineer told him to get out of the way." Such a plan would be about as effective as making it illegal for a brakeman to fall off a train. Trainmen and switchmen are in their places to couple cars, and they will do it without much reference to laws. If they have to cross the rails and place themselves in a perilous position, they will do so regardless of the position of the cars whether in motion or at rest. The only complete remedy lies in removing all necessity of applying the hand to the knuckles; and that this can be done has long since been demonstrated.

D. W. MCCORD.

Centrifugal Force and the Fly-Wheel.

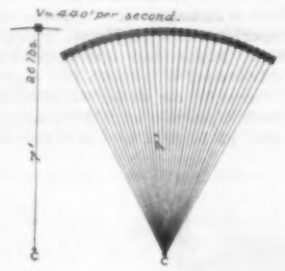
TO THE EDITOR OF THE RAILROAD GAZETTE:

Centrifugal force (C) may be ascertained as follows: Multiply the weight (W) in pounds by the square of its circumferential velocity (V), or speed in feet per second, and divide the product by 32.16 times the radius of revolution (r), or $C = \frac{W V^2}{32.16\ r}$

Example.—If a cast iron body weighing .26 of a pound and measuring one cubic inch in size be caused to revolve at a radial distance of 7 ft. from a centre, and at 10 revolutions per second, its centrifugal force will be:

$$C = \frac{.26 \times 27201.9}{32.16 \times 7} = \frac{7072.49}{225.12} 1.41\ l = 3\text{lbs.}$$

or a cubic inch of cast-iron weighing .26 lbs. will exert a centrifugal or radial force of 223.15 lbs., tending to break the 7-ft. rod attaching it to its centre of revolution. If now a series of these cubic-inch pieces be placed side by side, each being attached to the common centre C, sufficient to complete a whole circle of 7 ft. radius, each inch of circumference of which exerts a similar centrifugal force, the problem at once becomes that of the cylindrical boiler in which the stress per square inch of section (S) equals the steam or internal pressure in pounds (P) multiplied by the radius (R) in inches and divided by the thickness (t) of metal of shell or rim; or $S = \frac{P\ R}{t}$, and with the thickness of metal at one inch, $S = P\ R$, and $S = 223.15 \times 84 = 18{,}744.60$ lbs. strain per square inch of section.



Example.—With the same cubic inch revolving at the same radius, but at a rate of 225 revolutions per minute or 3.75 revolutions per second, the centrifugal or radial force will be:

$$C = \frac{.26 \times 27{,}201.9}{32.16 \times 7} = \frac{7{,}072.49}{225.12} = 31.41\ \text{lbs.}$$

$S = P\ R$; $S = 31.41 \times 84 = 2{,}638.44$ lbs. per square inch of section.

The complete formula for any fly-wheel stress becomes therefore $S = \frac{W V^2}{32.16\ r} \times R$, and as already seen in the working out of the last two examples, R of the stress formula being equal to 12 times the r of the centrifugal formula, the formula then becomes

$$S = \frac{W V^2 \times 12\ r}{32.16\ r} = \frac{W V^2}{2.68}$$

But W = the weight of a cubic inch of cast iron or .26 pound;

$$\text{hence, } S = \frac{.26\ V^2}{2.68} = .097\ V^2;$$

but again V = the circumference of the rim multiplied by the revolutions per minute, and representing the revolutions by R,

$$V = 2 \times 3.1416\ R\ r$$

$$\text{and } S = .097\ (2 \times 3.1416\ R\ r)^2 = 3.83\ R^2\ r^2$$

In addition to this radial or centrifugal stress, there is the load of the lower half of the rim to be supported by the upper half through the wheel section, and as this varies at every instant of revolution, additional sectional strength should be applied to the whole rim. This weight may be represented in terms of the rim radius in feet, as follows: $W = .26 \times 3.1416 \times 12\ r = 9.8\ r$. The revolving stress then becomes $S = 3.83\ R^2\ r^2 + 9.8\ r$.

Example.—Given a 14-ft. fly wheel making the high rate of 225 revolutions per minute or 3.75 revolutions per second, to find the centrifugal and load stresses per square inch of rim section.

The revolving stress, $S = 3.83\ R^2\ r^2 + 9.8\ r = 2{,}707.71$ lbs. The number of arms and their individual strains are found as follows:

Example.—Assuming a wheel 10 ft. in diameter with the rim weighing 8,345.40 lbs., and containing 32,098 cu. in. of metal, to find the strain upon the arms when revolving at 150 revolutions per minute, $S = 3.83\ R^2\ r^2 + 9.8\ r = 647.44$ lbs. per sq. in.

The cubic inches in rim divided by the circumference will give the area of rim section $= 32{,}098 \div 377 = 85.14$ sq. in.

The centrifugal strain and weight-load per square inch (647.44 lbs.) multiplied by the rim section (85.14) gives the total load on the arms at 55,123.04 lbs. Using six arms, each would have to carry 9,187.17 lbs. Giving the arms the same strain per square inch of metal as the rim, then $9{,}187.17 \div 647.44 = 14.19$ sq. in. for the sectional area of each arm.

A feature to which very little attention has been given is the amount of strain brought to bear upon the arms of a fly-wheel by reason of the wheel not running true, either through an improper bore or not being turned true. Take, for instance, the 10-ft. fly-wheel weighing 8,345.40 lbs., above mentioned, and consider it set so that the rim moves to and fro ¼ in. each revolution. The effective moment of such to and fro movement is equal to one-half the weight of wheel rim multiplied by the radial distance of the centre of gravity of the one-half rim from the centre, and this multiplied by the movement of rim per minute will give the foot pounds of force acting to warp the arms to and fro in a line with the shaft or axis.

For the one-half circle of rim, or for any portion of it, the centre of gravity lies in the radius bisecting the arc, and the distance of such centre of gravity from the centre of the arc is ascertained by multiplying the radius by the chord of the arc, and dividing by the circular length of the arc. The result is the radial distance of the centre of gravity from the centre of circle or motion.

A rim 10 ft. in diameter has its centre of gravity distant from the centre at a point equal to the radius (5 ft. multiplied by the diameter (10 ft.), and divided by half circumference (15.708 ft.) = 3.18, the radius in feet of the centre of gravity. Now, one-half the weight of rim (8,345.40 ÷ 2 = 4,172.70 lbs.) vibrates back and forth one-quarter of an inch, or one forty-eighth of a foot for each revolution. This $4{,}172.40 \div 48 \times 3.19$, the centre of gravity radius, gives a straining force of 276.70 foot pounds for each revolution, or 41,505 foot pounds per minute.

For the 14-ft. rim, weighing say 6,000 lbs., the centre of gravity will be at 4.45 ft. from the centre of motion. Half the weight of rim, $3{,}000 \times 4.45 \div 48 = 278.13$ foot pounds per revolution, and $278.13 \times 225 = 62{,}579.25$ foot pounds per minute. The advisability of having the wheel run true is then quite apparent.

W. H. WEIGHTMAN.

Specification versus Brand.

There has lately been considerable discussion of the question whether goods should be bought and paid for solely on the statements of the seller, as regards quality, trusting to his honor and making it a rule to deal only with men of established reputation; or only upon constant and rigid tests, regardless of guarantees, however high may be the name attached to them. We are permitted to quote the opinions on this matter of a number of our most prominent railroad mechanical officers, and we print their letters below. Some comment on them will be found in the editorial columns.

[*A*]

"The necessity for testing material, not only by railroad corporations, but by the more prominent manufacturers and especially by the governments of different countries, is too well established to have any aspect of novelty about it.

"Manufacturers sometimes, without giving the subject due consideration, are apt to think that specifications reflect directly on the honesty of the head or heads of the industry that may be subjected to specifications. I think this is altogether a wrong view of the matter. If the partners in the large locomotive concerns could see each part of the locomotive constructed in their works, no railroad company would ever have occasion to send an inspector to check them up. The same comments would apply to the heads of car industries, steel works, malleable iron works, etc. The specification is not intended to act as a check on the heads of the departments but it is intended to act as a check on those they have in charge, and who are held responsible for the various sub-departments. Some years ago I was connected with a railroad that had quite a serious time with law suits on account of sparks from locomotives. Very strict orders had finally been issued about having the spark arresters thoroughly closed up, with no opening or holes in them. This was important inasmuch as the only way in which the railroad company could successfully contest the suits was by showing the spark arrester to be in perfect condition. On one division the delays finally became so frequent, especially to passenger trains, that something had to be done. It was winter time. The traveling engineer was summoned to the office of the superintendent of motive power, and the following conversation took place:

"'Smith, your engines are steaming very badly, especially on passenger trains.'

"'Smith replied promptly, 'I know it, sir.'

"'Well, we can't have any more of this, our passenger engines have got to be made to steam. Can't you make them steam?'

"'Smith replied promptly, 'Yes, sir.'

"He was then told that the superintendent of motive power did not want to hear any more complaints of passenger engines failing on that division. Smith went back to the shop and put some holes in the netting of the passenger engines, and there was no more trouble.

"There is no doubt in my mind but that questions of just this character come up in large manufacturing industries. The heads of the departments cannot possibly know the various devices their sub-officers are obliged to resort to in order to bring about the results desired by the firm. From a monetary point of view, it is doubtless also quite an advantage that the heads of the firms should be in ignorance of much of this. A specification is, to my mind, the only check on every one doing honest work."

[*B*]

"We do not believe that any move on the part of manufacturers can change the growing practice of railroad companies and others to contract for locomotives and other machinery and equipment, with accompanying specifications governing the quality of material to be furnished. Speaking from the broad ground of the interests of railroad companies as well as of manufacturers, we should say that a change in this respect would not be desirable. The specifications of materials as furnished by railroad companies are of value to manufacturers of machinery and equipment in enabling them to reach and maintain the highest standard of excellence."

[*C*]

". . . Some six years ago certain manufacturers of bridge material tried to dictate to buyers and got up their own specifications for the material that was to be used and tried to enforce its use generally by combination. The engineers of the country never took any notice of it, and the thing fell flat after about six months. . . . As far as this road is concerned, as long as I am connected with it, we shall purchase material strictly on specifications, and we will not accept any material, even from the most reliable makers, without careful inspection, as I have the greatest abundance of proof in my office now, and it is coming in almost daily, of cases where manufacturers of the most reputable class, are constantly having slip-ups (through the carelessness of their employés) in the material that they furnish. It would be equally just for tailors to form a combination and tell people what class of clothes they were to wear."

[D]

"To abandon the practice of purchasing material in accordance with exact specifications would be a very great mistake, not only for the railroads, but for the manufacturers as well. Rigid specifications properly enforced must influence manufacturers in using the very best possible material in the manufacture of goods, in order that they may not suffer either in reputation or pocket in case the material is rejected. As a rule, the products of a shop deteriorate, not because its owner wishes to deal dishonestly, but rather through the efforts of subordinates to make a better showing, or through their negligence in not looking properly after the details of manufacture. As railroads are always willing to pay a fair price for the best material that can be procured, the manufacturer can, without injustice to himself, afford to deal honestly. Any failure to do so through the fault of his employés is an injustice to him. In this respect specifications are of great value to him. While in many cases the methods of testing material may not be absolutely certain, yet they certainly have a moral effect upon the manufacturer, which is, as stated before, to the best interests of both producer and consumer."

[E]

"The report of our Master Mechanics' Committee last year on this subject outlined my views, and these I have not changed. The battle with manufacturers has, I think, been already fought, and I see no reason for reopening the question. In fact, my experience with more than one firm who have an established reputation has been that this cuts a very small figure in the scramble for business on the reduced margin of profits in vogue now. I do not, therefore, believe in buying on the character of the dealers, but I do believe in buying on the record of performance. . . .

[F]

" . . . Our experience in the matter has been that the most reputable manufacturers bear a little watching. . . . Many roads are not so fortunate as to have chemical and physical laboratories, and on that account it is frequently necessary to buy certain material, such as paint, etc., without placing much reliance on any specifications, as a chemical analysis of paint when made outside entails considerable expense. In such cases the only resource is to specify some standard make or brand, and such a course will certainly secure a better grade of material than if a less reputable manufacturer received the order. The character of material furnished, either by reputable or non-reputable manufacturers, is very largely dependent upon explicit and intelligent specifications."

[G]

"The question as to whether it is advantageous to buy on specifications or on the character of the dealers and the record of the performance, is a very important and complicated one. The misfortune with specifications is that as a rule they are not adequate or complete. Many specifications can be fully complied with, and yet the material, when placed in actual service, will give very inferior results. I know of no specifications which fully cover the requirements.

"Buying on records of performance is satisfactory, but it is difficult and expensive to keep such records, and few complete records of this kind are kept.

"The matter of testing material and making specifications for material for railroads is in its infancy, and there is, perhaps, as much room for improvement and advancement in this particular line as in any other branch of railroad work."

[H]

"This company has no idea whatever of abandoning its practice of purchasing upon specifications, and believes it to be the only sensible method of obtaining material. It is a great advantage to honest dealers, and places those who have materials to dispose of upon the same footing. The character of dealers and the records of performances are altogether too indefinite to consider from a business standpoint. We are constantly issuing new specifications and expect to continue so doing."

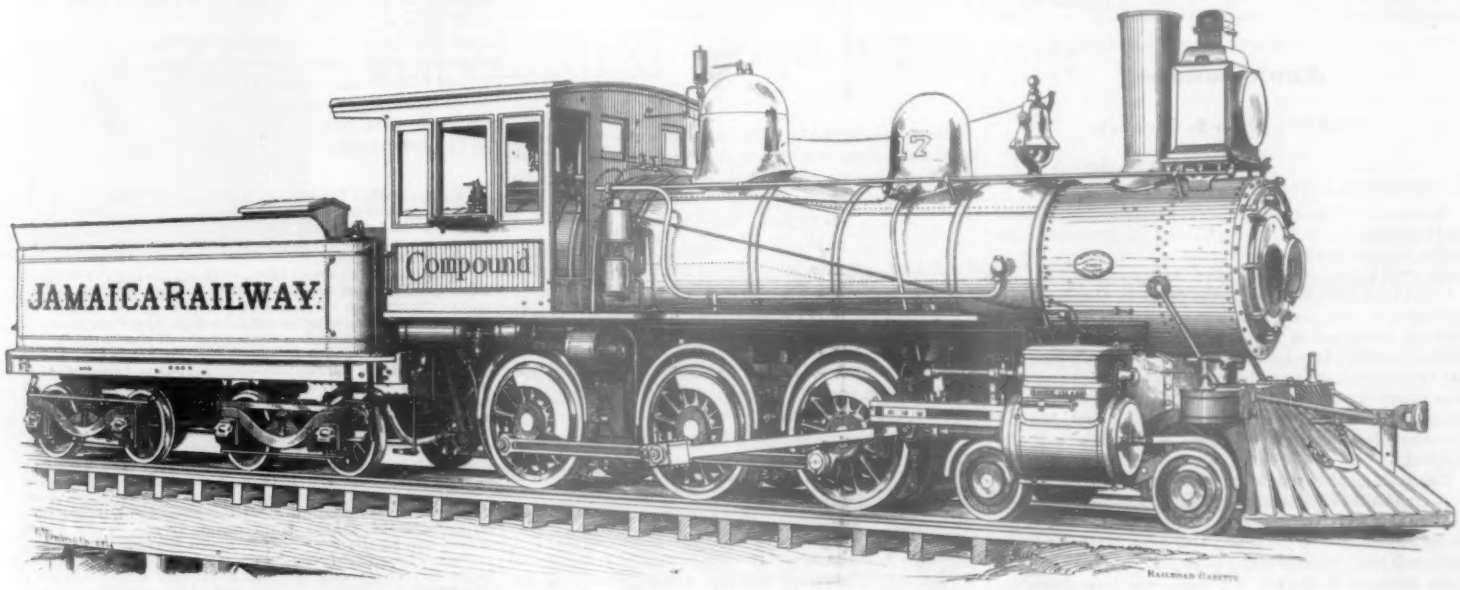
[I]

"I am not at all in favor of trusting to the honesty of steel men; there are some steel men that have good principles and who will not make and sell an inferior grade of goods, but they are few and far between. Even with the best physical and chemical tests, it is very hard to determine the nature of steel. Careless workmen in the mills are often largely at fault for poor steel, even with a good quality of stock to work from. Steel makers do not know very much more about steel than buyers, and it would pay them to send their experts out among their customers, especially among railroad men, and endeavor to ascertain the cause of so many failures in steel. By being on the ground and seeing the different failures, especially in fire boxes, and making a series of tests and investigations of old fire boxes, I think they would obtain some valuable information. As it is, they have only their laboratory to work from, and the difference between the laboratory and actual service is very wide.

"I find in a lot of new engines when we receive them there are always a few that do not last as well as the others; often the fire boxes give way before they are a year old, while others of the same class, and manufactured by the same makers, will last for years. This shows carelessness in the manufacturing of steel. I feel so desperate many times over some of these fire boxes that give out in a short time that I hardly know how to contain myself."

Rhode Island Compound for the Jamaica Railway.

The illustration printed herewith shows a two-cylinder compound locomotive built by the Rhode Island Locomotive Works, Providence, R. I., for the Jamaica Railway, Island of Jamaica. It was designed by Mr. J. E. Sague, Superintendent of Motive Power, and Mr. Joseph Lythgoe, Agent and Superintendent of the Rhode Island Locomotive Works. The engine was ordered by Mr. Sague for the purpose of effecting the saving in fuel which is possible with the compound where coal costs from $8 to $9 a ton, as it does in Jamaica.



TWO-CYLINDER COMPOUND LOCOMOTIVE FOR THE JAMAICA RAILWAY.

Built by the RHODE ISLAND LOCOMOTIVE WORKS, *Providence, R. I.*

The engine runs on the mountain division of the road, where there are both heavy grades and sharp curves. It is similar to a number of ten wheel simple engines on the same road, and its work will be compared with theirs. The following are the general dimensions:

Cylinders	18 and 28 × 24 in.
Drivers, diameter	50 in.
Driving wheel base	11 ft. 11 in.
Total wheel base	22 ft. 4¼ in.
Boiler shell, diameter	54 in.
Firebox	90¾ × 34 in.
Number of tubes	197
Tubes, diameter of	2 in.
Driving axle journals, diameter	7½ in.
" length	9 in.
Truck wheels, Allen, No. 9, diameter	26 in.
Truck axles, diameter	5 in.
" length	10 in.
Tender journals, diameter	4¼ in.
" length	8 in.

The slide valves are balanced, and the piston rods are made of cold rolled steel. The tires are of Midvale steel, 3 in. thick. The driving-wheel boxes and the connecting-rod bearings are of Damascus bronze. The tender truck wheels have Krupp steel tires and spoke centres.

This engine is fitted with the Westinghouse air brake, Nathan double sight feed lubricators and United States metallic packing. The fire box is furnished with a fire brick arch and the crown is supported by radial stays. It has the starting valves and intercepting valves of the Rhode Island Works pattern, illustrated in the *Railroad Gazette* of Dec. 11, 1891.

Convention of Railroad Commissioners.

The fourth annual convention of State Railroad Commissioners was held at Washington, D. C., on April 13 and 14. The call was issued by the committee appointed for that purpose last year, of which ex-Interstate Commerce Commissioner Cooley was chairman, and Judge Cooley wrote a letter to the meeting, but his health was such that he could not attend in person. The meeting was called to order by Commissioner E. P. Jervey, of South Carolina, the next member on the committee to call the convention, and he was subsequently elected permanent chairman of this meeting. The five Interstate Commerce Commissioners, commissioners or representatives from 27 states and six members of the Association of American Accounting Officers were present. The principal states not represented were Alabama, Kansas, Mississippi, New Hampshire, Oregon, Texas and Vermont.

The Committee on Uniformity in Railroad Accounting made a report covering two topics, (1) Shall taxes be considered as a fixed charge or as an operating expense? and, (2) Shall the assignment of expenses to freight and passenger traffic be continued? The majority of the committee favored the inclusion of taxes in operating expenses, though it was stated that no good reason exists for not making the statement of percentage of expenses to earnings both ways, the taxes excluded and the taxes included.

A minority report was presented urging that as taxes are not determined or controlled by the management they should be reported separately. The fact that the taxes are an *expense* does not justify classifying them as an *operating* expense. It would be equally fair, it is held, to regard the interest on the funded debt as an operating expense. The rate of taxation varies, and sometimes varies within the same state.

The committee presented a discussion of the rules in the Interstate Commerce Commission form of annual report for dividing expenses between passenger and freight traffic, and pointed out instances where the arbitrariness of the rule produced erroneous figures. Some roads on the frontier do about all their business on mixed trains and passengers ride on cabooses throughout the West, yet under the Commission's rule mixed trains must bear their share of general expense, and of other outgoes which cannot be accurately divided, on the assumption that the train is one-fourth passenger and three-fourths freight. The Illinois Central has reported to the Commission that this method of dividing expenses has resulted in some cases on that road in reducing the apparent [net] receipts per passenger mile to ridiculously low figures.

The committee is unanimous in favor of discontinuing the attempt to apportion expenses between freight and passenger traffic. This report recommends that the Interstate Commerce Commissioners' form for annual reports be changed so as to subdivide the heading of general expenses, putting superintendence, hire of equipment, clearing wrecks, oil and waste, outside agencies and advertising, commissions, stationery and printing under the head of "conducting transportation." Mr. William O. Seymour, of Kentucky, is chairman of this committee.

This report was discussed at considerable length, but nothing of importance brought out. The convention finally voted, on motion of Mr. Luke, of Iowa, that the convention indorse the views of the minority, and that taxes be not reported as a part of operating expenses.

The Committee on Reasonable Rates, of which Mr. Fleming, of Kentucky, is Chairman, made a long report. It appears that this, as well as some other reports made to the convention, were got up in a way quite familiar in technical railroad conventions: that is, the chairman of the committee did practically all the work, and simply secured the signatures of the other members. The discussion of this subject was postponed until the second day,* and the report of the Committee on Discrimination by the Use of Private Cars was read by Mr. Wheeler, of Illinois, the chairman, who said that those members of the committee who were present could sign it if they agreed to the sentiments it contained. This committee was appointed after the reading of Judge Schoonmaker's paper at last year's convention, and the report is a strong presentation of the evils attending the use o

* The report of the second day's proceedings has failed reach us.—EDITOR.

private cars under the customs now existing. It goes considerably into details, and gives figures from actual records more at length than did Mr. Schoonmaker. The committee is convinced that a great many railroad officers are earnestly desirous of abolishing this abuse, and letters to this effect are presented from certain general managers, though their names are not given. The report closes with a series of recommendations, which were printed in the *Railroad Gazette* last week.

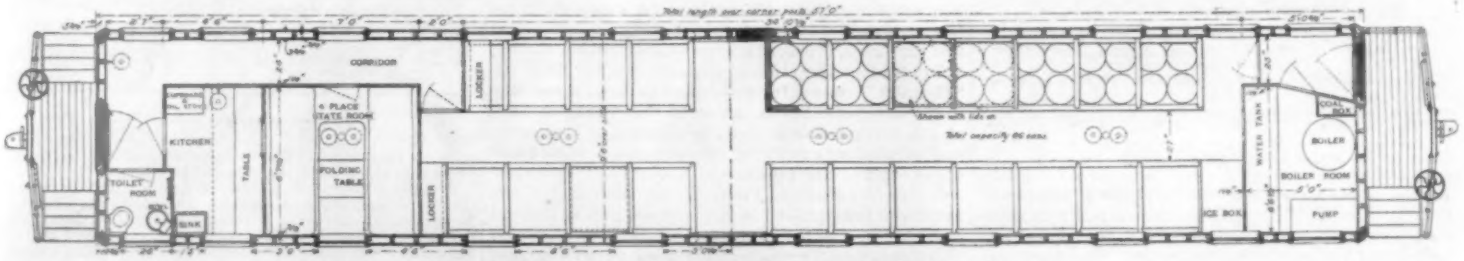
These recommendations are, in brief, that the government should regulate the mileage rate on private cars, loaded, and forbid the payment by railroads of mileage on empties; that passes to men connected with private car companies should be declared unlawful; that railroads hauling private cars of a special kind be compelled to provide sufficient similar cars for all shippers; and that there be a special provision in the law empowering the Interstate Commerce Commission to adjudicate complaints of unjust mileage payments. This committee's report contains the following paragraph:

Car Trusts.—Although somewhat remote from the subject under consideration, it may be interesting to note one phase of the operation of what are known as car trusts, an illustration of the workings of which is furnished by the following figures, taken from the balance-sheet of a trust that closed its operations recently, and in the operation of which little (if any) capital was furnished by the officials who organized it, the amounts accruing from the railway companies in the way of rentals being sufficient to meet the required payments on the cars. The figures given represented 2,000 cars, costing $900,000. Those cars were rented to the railway company at the rate of $81 per year, the railway company to make all the repairs at their own expense. At the end of three years the cars were sold to the railway company for their original cost less six per cent. for *two* years, amounting to the sum of $792,000, notwithstanding the fact that the railway company had already paid to the trust in the way of rentals considerably more than half the cost of the cars when new. The amount received by the trust for rental during the three years was $486,000. Add to that sum the amount received from the sale of the cars and we have $1,278,000, from which deduct the original cost of the cars—$900,000—and there was left a net profit of $378,000 to the trust—quite a handsome return for men whose only necessary capital was opportunity and the ability to "financier."

New York State Fish Car.

This car was built by the Gilbert Car Co., of Troy, on plans made by the State Fish Commission. The body of the car is 57 ft. long and 9½ ft. wide, and has 6-wheel trucks. As only $3,500 was appropriated to build the car it was not possible to complete it as laid out in the drawings. In its present shape it contains a toilet room, kitchen and state room; the rest of the interior is left vacant like an ordinary baggage car. The kitchen contains an oil stove, sink, etc., and a table with a folding leaf which is wide enough to make a berth upon. In the partition between the kitchen and state room is a sliding door to pass the meals into the adjoining room. The state room has two sofa seats covered with maroon enamel cloth and one long folding table that will be used for dining purposes. The backs of the seats raise and form the upper berths. It is the intention, if $2,000 can be secured, to complete the car as the drawing indicates, so that it can be used both for transporting young fish fry in cans as well as hatching shad. In the main body of the car are four upright closets for the crew to keep their clothing, and lockers are intended to be built along each side of the aisle to keep the cans containing the fish. These lockers are to be built without partitions, lined with galvanized iron and several strips of half round iron fixed to the floor to slide the cans upon. Loose covers make the top of the lockers, with doors on the end to slide the cans in. On each side of the car there is a small outside door level with the floor to load or unload the fish. In the boiler room will be a boiler, pump and pressure tank. Another tank is to be located under the floor to carry a supply of water. When hatching is carried on, portable pipes with numerous pet cocks attached would run along each side of the car to bring the water from the pressure tank and distribute it to the glass jars containing the eggs.

This car differs from other fish cars in that the sleeping quarters for the crew are separate from where the fish are kept. This reduces the fish carrying capacity of the car, but it is better for the health of the men. The floor and sides of the car are made extra strong. It is expected that the railroads of the state will haul the car free, as is done in several Western states that have such cars; in fact several prominent New York roads have already signified their willingness to do so.



CAR FOR THE NEW YORK STATE FISH COMMISSION.

Built by the GILBERT CAR MANUFACTURING COMPANY, *Troy, N. Y.*

The History of the Equalizing Lever and the Development of the "American Type" of Locomotive.

BY E. P. EASTWICK, JR., C. E.

The application of locomotive engines to railroads in the United States was contemporaneous with their practical use for that purpose in England, for at the same time that Messrs. Stephenson were building the "Rocket" they were supplying two engines of the same pattern to the Delaware & Hudson Co. for the Carbondale Railroad.

The "Rocket" was placed and put in operation on the Liverpool & Manchester Railroad in October, 1829, and the two engines above mentioned arrived in New York in the winter of 1828-29, together with one built by Foster, Rastrick & Co., of Stourbridge, also for the Carbondale Railroad. Had the Stephenson engines been put in operation shortly after their arrival the trial of the "Rocket" would have been anticipated. The Stourbridge engine, named the "Lion," was tried and run on the Carbondale road, Aug. 9, 1829, by Horatio Allen, who was the first person to run a locomotive on a railroad in America. It has not been recorded what became of the two engines built by Messrs. Stephenson. The "Stourbridge Lion," so far as known, was the only one of the three engines which was ever placed on the road, but on account of the weight being too great, was in use only a short time.

Locomotive building in this country was begun in 1830, and the first engine completed was the one named the "Best Friend," which was built for the South Carolina Railroad Co., and tried in August of the same year. In 1831 and 1832 the West Point Association and M. W. Baldwin, of Philadelphia, received and executed orders from various railroads, and by 1835 Messrs. Rogers, Ketchum & Grosvenor, of Paterson, N. J., Wm Norris and Garrett & Eastwick, of Philadelphia, and others were extensively engaged in locomotive building.

The first American engines were designed, to a great extent, from models furnished by English locomotives, of which there was a considerable number imported and used. It, however, soon became evident that the conditions of railroads in this country made requirements differing from those demanded in England, and in view of these conditions it was desirable to have a locomotive which would be more flexible and the weight of which would be more equally distributed on the rails than was

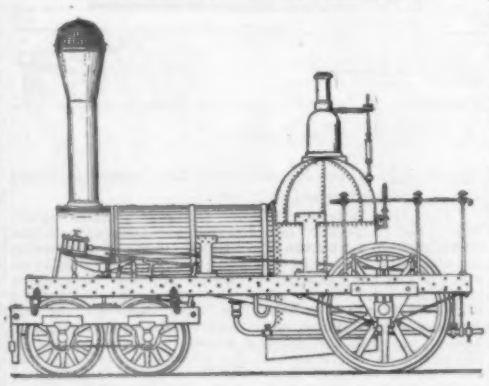


Fig. 1—Engine Built by H. R. Durham & Co., 1837.

the case in the English engines, and hence a departure from this prototype became necessary and the so-called "American Type" of locomotive was originated.

The first step taken in this direction was the invention of John B. Jervis in 1831, who designed what he called "a new plan of frame with a bearing carriage for a locomotive engine," for the engines of the Mohawk & Hudson Railroad, and which was applied in 1832. In a letter published in the *American Railroad Journal* of July 27, 1833, he describes his invention as follows: "The leading objects I had in view in the general plan of the engine did not contemplate any improvement in the power over those heretofore constructed by Stephenson & Co., but to make an engine that would be better adapted to railroads of less strength than are common in England; that would travel with more ease to itself and to the rail on curved roads; that would be less effected by inequalities of the rail than is attained by the arrangement in the most approved engines."

The advantages gained by the use of a truck were at once recognized, and it was very soon adopted in American locomotives, and also in some instances on English engines built for American railroads. Engines made according to this design were constructed with a frame supported on one pair of driving wheels and a four wheel truck. The driving wheels were placed either behind or in front of the firebox, and the truck was attached to the frame centrally by a king pin, and revolved thereon.

Fig. 1 represents an engine constructed by H. R. Durham & Co., of New York, in 1837, for the Harlem Railroad, in which the driving wheels are placed behind the firebox, closely resembling the Baldwin engine of that period. In this arrangement the distribution of the weight of the engine was such that only a small portion rested on the driving axle, insufficient to produce the necessary friction and adhesion between the driving wheels and the rails for the tractive power required, and to remedy this evil provision was sometimes made for transferring a part of the weight of the tender to the driving wheels. The "Batavia," built by Mr. Rogers in 1838 for the Tonawanda Railroad, was so constructed. Mr. Baldwin, in some of the engines built by him at this time, also employed a similar arrangement patented by Ezra L. Miller for using the weight of the tender to increase the tractive power of the engine.

In fig. 2 is shown an engine with the driving wheels placed in front of the firebox as represented by the "Sandusky," built in 1837 by Messrs. Rogers, Ketchum & Grosvenor. By this adjustment a larger proportion of the weight was made to bear upon the driving wheels than when the latter were placed behind the firebox, but there was occasioned thereby an overhang which caused an excessive strain to be brought upon the axle. To remedy this defect in other engines, of which the "Stockbridge," fig. 3, is the general type, supplementary or trailing wheels were placed behind the firebox for the purpose of support. But inasmuch as this was an improvement on the engine last described on one hand, it was also a disadvantage on the other by reducing the weight on the drivers and consequently the tractive power of the engine.

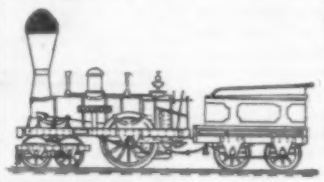


Fig. 2—The "Sandusky," 1837.

Henry R. Campbell, of Philadelphia, seeing this, now conceived the idea of substituting a second pair of driving wheels for the trailing wheels and connecting them by means of outside rods with the main driving wheels, so as to obtain the additional traction developed through the weight thereby sustained. Campbell's patent, dated Feb. 5, 1836, reads as follows: "My improvement consists in the combination and application to each locomotive steam engine of two pairs of driving or propelling wheels and two pairs of guide wheels. I also claim, as a modification and as a part of my improvement, the combination and application to each locomotive steam engine of two pairs of driving wheels and one pair of guide wheels. What I denominate guide wheels are those which carry a portion of the weight of the engine and conduct it along the railroad without connection with the driving wheels. The objects in view are to increase the weight and power of the engine; to extend its bearing and weight over a larger portion of the road; to increase the adhesion by doubling the number of driving wheels; to increase the facility for turning curves by compounding the leverage of the engine upon the flanches of the wheels against the edges of the rails to reduce the wear and tear, and consequently the expense of transportation on railroads." Jas. R. Brooks, of Philadelphia, built the first engine on this plan for Mr. Campbell in 1836, and the same was illustrated in the *American Railroad Journal* of July 30, 1836. Fig. 4 is a copy of the original drawing from which the first eight-wheel engine was made.

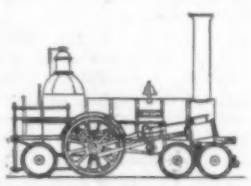


Fig. 3—The "Stockbridge."

In Campbell's form of engine there was a separate spring for each driving wheel, which rested on the axle

box and sustained the larger portion of the weight. These springs acted independently, and while preventing shocks and thus causing the easy riding of the engine, were the means by which the weight was distributed and each of the driving wheels kept in contact with the rails on inequalities of track. The engine, however was but partially successful in realizing the advantages which were expected and claimed for it, for while it served its purpose and answered satisfactorily the requirements on well-laid and even roads, it failed completely on the imperfectly surfaced tracks and poor roadbeds of the American railroads of these earlier years. The distribution of the weight to be sustained upon the driving axles depended upon the rigidity of the springs and when an uneven surface occurred causing a depression of any one of the drivers only that load was transferred to it which the compression of the springs of the others allowed. American railroads at this time were

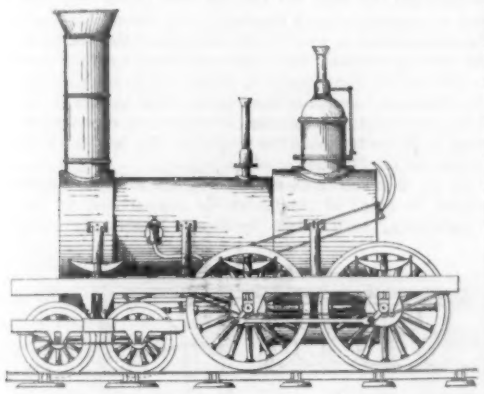
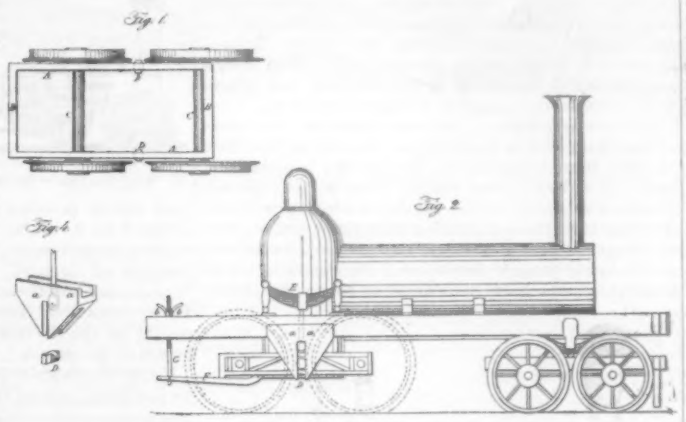


Fig. 4—Campbell's Engine, 1836.

in most instances laid with the well-known "strap rail," notable as the first attempt at rolling the iron into shape for the purpose, and consisted of flat bars of rolled iron spiked down to longitudinal stringers. The more modern forms of iron rails in various sections were just commencing to come into use, but at best the roads were uneven and imperfectly laid and the rails capable of sustaining but a small concentrated load.

As the demands for more powerful engines was rapidly increasing, which could only be met by adding to the weight and the proportion sustained by the driving wheels, the necessity of some means for more uniformly distributing the load on each of the drivers became of great importance. To accomplish this object Andrew M. Eastwick, of the firm of Garrett & Eastwick, of Philadelphia, was then the first to propose and carry out the plan of sustaining the whole weight of an engine, having two pairs of drivers on three points of support, which, as exemplified in the surveyor's tripod, insures contact of all three points at the same time, however, rough or uneven the surface on which they rest. The truck for locomotives, as we have already seen, was at this time used on nearly all engines made in this country. It carried the forward part of the engine, so that the weight bore on a central point, but the weight of the rear part, where more than a single pair of drivers were used, was distributed on several wheels, each of which formed a separate point of support. The problem was now to connect the drivers with the engine in manner such that the weight of the rear portion of the engine would have but two points of support, yet would be uniformly distributed over the driving wheels. It was in the solution of this problem that the equalizing lever was developed and had its origin. The United States patent granted Mr. Eastwick,* Nov. 20, 1837, was entitled: "Improvement in the mode of applying the driving wheels of locomotive engines." Copies of the drawings which accompanied the specifications are shown below. The patent thus describes the invention:



A. M. Eastwick—Car Propeller.

. . . "In my locomotive engines I use eight wheels, two pairs of driving and two pairs of guide wheels, the latter not differing at all in the manner of arrangement or operation from such as have been heretofore employed, my improvement consisting entirely in the mode in which I construct an independent frame or truck to receive axles of the four driving wheels, and in which I connect the same with the main frame of the locomotive. Fig. 1 represents the four driving wheels with their frame or truck *A A*, being the sides, and *B B* being the ends of said independent frame or truck. *C C* are the axles of the wheels running in proper bearings in the side pieces, *A A* of the frame. Through the middle of each of these side pieces there are run holes, bored true, to receive two short axles or bearing pieces, *D D*, which project out on either side of the frame to a distance equal to the thickness of the pedestals which embrace the side pieces, and which have suitable notches or openings, into which the projecting ends of the short axles are to pass, these ends being cut, or notched, as shown in the drawing, to enable them to slide within the openings. Fig. 2 is a side view of the locomotive with the driving and guide wheels in place. One of the short axles, or bearing pieces being seen in the opening of the pedestal, *a a* (see also fig. 4), in which it slides up and down freely, obeying the motion of the spring *E*, the bearing rod or bolt from which acts upon the centre of the independent truck or frame of the driving wheels. It will be seen that the frame of the driving wheels, having always the whole bearing of the load upon them in the centre, will transfer that bearing equally on each of the wheels, so that, notwithstanding inequality or undulation in the rails, the wheels will still under all circumstances sustain an equal portion of the weight on each of their four points of contact with the railroad. I am aware that four driving wheels have been previously used, but as these have had the bearings of their axles on the main frame of the locomotive they have not performed the office of distributing the weight and of equalizing the adhesion; every inequality of the road when the wheels are thus fixed tending only, alternately, to increase and diminish the pressure on each pair of wheels. . . . . What I claim as my invention and wish to secure by letters patent is the employment of four driving wheels in a locomotive engine in such a manner that these wheels shall have the bearings of their axles in an independent frame or truck, connected with the main frame of the locomotive substantially in the way herein described."

It will be seen at once that the arrangement described in this patent is substantially the "equalizing beam" of to-day, the principle of action being the same and only differing in matter of detail. The main difference lay in the fact that the equalizing beams on each side of the engine were rigidly connected so that virtually a frame was formed.

The "Hercules," fig. 5, was the first engine on which Mr. Eastwick's improvement was used, and it was then constructed in the manner above indicated. This engine was built early in 1837 by Garrett & Eastwick for the Beaver Meadow Railroad, and though doubts were at first expressed, it proved a great success and led to other orders for the same class of engines. Shortly after the "Hercules" was put in operation on the road it was seen that a more perfect equalization of the weight on each of the driving wheels would be obtained if a separate and independent equalizing lever was placed on each side of the engine. The equalizing frame of the "Hercules" was therefore altered by making the two sides of the frame two independent beams, and discarding the end connections. The general construction is shown in fig. 5. This arrangement was afterward used on all the eight wheel engines built by Eastwick & Harrison, who succeeded Garrett & Eastwick. A drawing of one of the earlier engines on which the equalizing levers were used was made to accompany the report of the "Committee on Science and Arts" of the Franklin Institute, to which was referred for examination Messrs. Eastwick & Harrison's eight wheel locomotives. This report is dated May 9, 1839, and reads as follows:

"That these engines possess two peculiarities of an important character: one in the arrangement of the driving wheels and the other in the mode of maintaining the fire draft. It is well known to engineers that the efficiency of the locomotive engine depends, first, upon the quantity of steam which the boiler may be capable of generating in a given time, and, secondly, on the amount of friction, or, as it is technically termed, adhesion, between the driving wheels and the road. As the adhesion increases with the weight, it is evident that the engine becomes more effective by increasing its weight, and by throwing a greater proportion of this weight on the drivers. But a limit to this increase of weight arises from the incapacity of the road to sustain the great pressure thus thrown on a small bearing surface. To obviate this difficulty, engines have been made with all the wheels coupled so as to constitute them all drivers, and thus distribute the adhesive pressure over a greater extent of the road. Engines of this description are used for heavy and slow draft, but are considered unsafe, from their liability to be thrown off the track at curves. Another plan, patented a few years back by an engineer of this city, was to use four drivers, and at the same time to carry the front end of the engine on a guide truck, as in the six-wheeled engine." But here a new difficulty arose in consequence of the engine having three points of bearing in the line of the rails, on which its weight could not be properly distributed unless the road was entirely free from irregularities of surface, a condition not to be found on any of the roads which have come under the notice of the committee. The improvement invented by Messrs. Eastwick & Harrison is designed to obviate this difficulty by giving to the eight-wheel engine only two bearing points, one on the guide truck and the other on a frame supported by the driving wheels. The axles of the drivers are placed one in front and the other behind the fire-box, and are confined between pedestals of the usual form fixed to the main frame of the engine, which allow vertical play, but prevent any horizontal motion. The bearing pins, instead of abutting against springs fixed to the frame in the ordinary manner, are jointed to the extremities of horizontal beams of cast iron, one of which is placed on each side of the engine. To the centre of these beams, or levers, are jointed wrought iron rods, which pass down through the engine frame, and carry the springs which support the weight of the engine. The connecting rod of the piston is attached to the hinder wheel, and this communicates motion to the front driver by a coupling rod attached by a ball and socket joint. It is evident that this arrangement will allow to each driving wheel an independent vertical motion, with the advantage that the engine will partake of only one-half the vertical motion of either wheel, in consequence of being suspended at the centre of the horizontal sustaining beam. The front drivers are without flanges, in order to avoid any difficulty in turning curves. . . .

Trial of one of these engines on the road between Broad street and Peters Island was witnessed by several members of the committee on April 25 last. It happened unfortunately on that occasion that the business of the road did not furnish so many cars as were desirable for

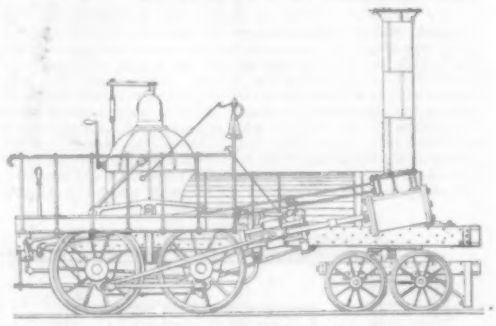


Fig. 5—The "Hercules," 1837.

a fair experiment. The particulars, so far as made known to the committee, were as follows:

Weight of engine, 28,350 lbs. Weight on drivers, 18,059 lbs. Cylinders, 12 in. diameter. Steam, 90 lbs. to sq. in. Length of stroke, 18 in. Driving wheels, 44 in. diameter. "The train consisted of 32 loaded cars, estimated at five tons each, two empty cars weighing 9,800 lbs. and tender five tons, making a total of 169 tons. This train was started, with great ease, on a rising grade of 27 ft. to the mile, and drawn to the foot of the inclined plane, the distance being three miles, partly on a rising grade of 35 ft. to the mile, with several short curves and the road in such a bad condition as to keep the sustaining beam in continual vibration."

"A few days after this experiment one member of the committee had an opportunity of witnessing a more decisive trial of the power of the engine. On the latter occasion the train consisted of 34 single cars, estimated at 5 tons each; 4 double cars, 10 tons each; one of Mr. Dougherty's iron boats, 50 tons, and the tender, 5 tons; total, 265 tons. This train was started without difficulty on the same rising grade of 27 ft. to the mile, and drawn over the 35-foot ascending grade and short curves with apparent ease, and with steam blowing off during the whole trip. . . . The satisfactory character of the experiments detailed above is sufficient to enable anyone who is conversant with transportation on railroads, to form a correct opinion of the merits of the engine. The impression of those members of the committee who witnessed the trials, is that it is well adapted for the use of anthracite as fuel and for very heavy draft; with less tendency to injure the road or to receive injury on a bad road, than engines of the usual construction."

At this time the "Hercules" had been running on the Beaver Meadow Railroad over two years and there were also several of Eastwick & Harrison's engines in use on the Hazelton, Reading and other railroads. But although this form of locomotive, which was afterward destined to become known as the "American type" was built by Messrs. Garrett & Eastwick as early as 1837 it was not until several years later that its adoption in this country became at all general.

*H. K. Campbell.

Fire Insurance on Railroad Property.

The fact that railroads are every now and then changing their methods of providing against the financial losses incident to fires indicates that the principles on which those methods are, or should be, based are probably not so well settled as they ought to be. These principles, if we consider all their ramifications, are not susceptible of brief statement, but a summary of their main points, and a statement of the different plans in vogue taken from a private letter recently written by a railroad officer who has given special attention to this matter, will be found of interest, and we print it below.

"Insurance in all its various branches is an effort to equate hazards and losses, or, in other words, an effort to determine what otherwise would be an uncertainty. You pay a premium, and to an extent defined in your policy you are protected from loss. If fire loss—a very uncertain element—can be reduced to a known fixed amount, you have measurably eliminated one of the great uncertainties of business. This subject has engaged the earnest attention of intelligent and energetic men for many years, and has resulted in the establishment of rates which are a close approximation to the loss, cost of transacting the business and a reasonable profit to the companies engaged in it.

"There is a wide diversity of opinion and practice on the part of officers and managers in charge of railroad property relative to fire insurance. Many companies, notably the weaker ones, content themselves with insuring only their most hazardous property and that only in such amounts as will prevent great loss at one

time. Such insurance is necessarily procured at high cost and does not cover the multitude of small losses to which the roads are subject. Others again, stronger financially, insure by schedule all their property that is subject to a fire risk, to, say, from one-half to three-fourths its value, and thereby secure the lowest rates at which such property can be covered; the premium paid determining, nearly, the cost to them of the fire loss for the year. Still others, and these are among the strongest companies, pursue a system of non-insurance, letting each year care for itself, the fire waste of the year being charged as an expense incident to the year's business. These companies sometimes capitalize a portion of the cost of the buildings erected to replace those destroyed.

"The first of these plans is better than no insurance. The second is the best of all, if fire insurance could be procured at less cost. The third is objectionable in that it does not equalize the burden of loss for a series of years, and is the exact opposite of the theory of insurance, which is an effort, more or less intelligent, to equate losses.

"A few companies pursue the plan of self-insurance or assumption of fire risk. This plan, if intelligently pursued, reduces the cost to a minimum. To be successful, however, it must be intelligently managed, and should be in charge of a department organized for the purpose, which should also be charged with the duty of inspection and protection. The companies who have pursued this plan have found their greatest profit in the improvement of their properties as regards fire hazard and the increased intelligence of their employés in the use of appliances provided for the extinguishment of fire. To derive the full advantage from this policy it is necessary to build up a fund to meet a possible heavy loss. This may be done by setting aside a sum in monthly or annual installments which would equal the premium that would have to be paid for the insurance if procured from outside parties."

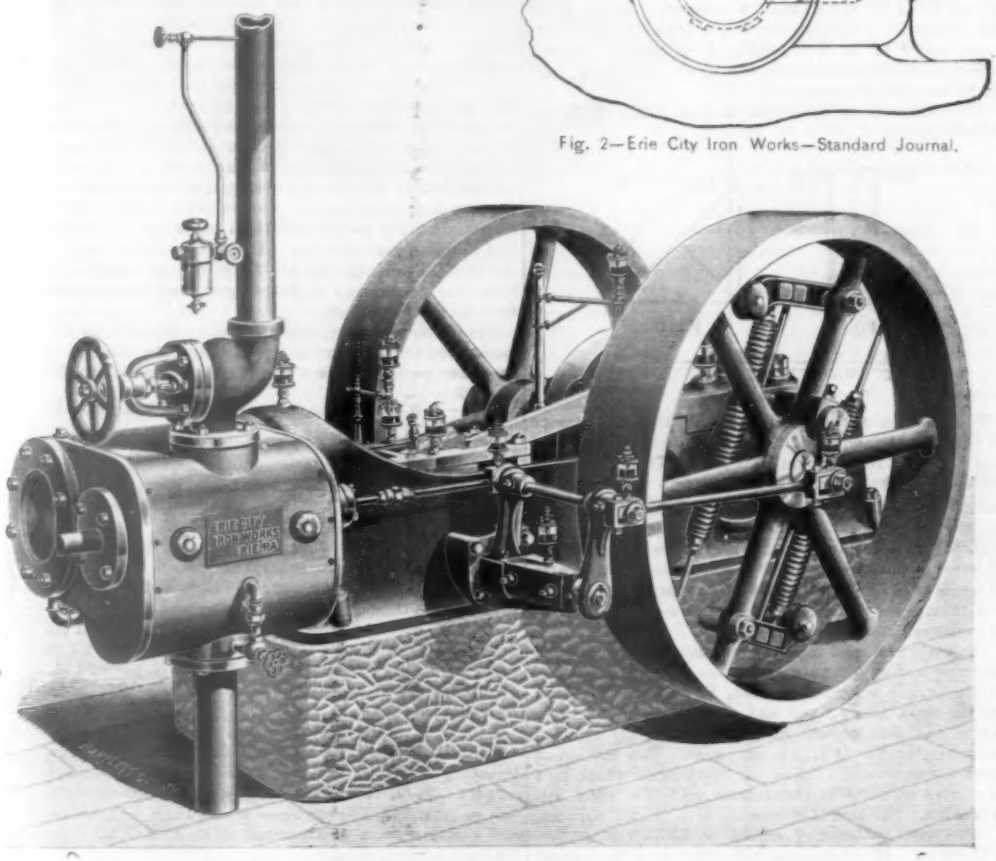


Fig. 1.

HIGH SPEED ENGINE.

Built by the ERIE CITY IRON WORKS, *Erie, Pa.*

Performance of a High Speed Engine.

In the *Railroad Gazette* for Dec. 18, last, in the report of the American Society of Mechanical Engineers, we gave some indicator cards showing the close regulation accomplished in a high speed stationary engine built by the Erie City Iron Works. We now give a cut of the engine itself (fig. 1) and some further information regarding the close regulation and the design of the journal bearings. The diagrams, fig. 3, show the perfection of regulation and the shape of the indicator cards when the engine is governed by the new Weber governor. As the lead increases the load increases, thus giving a higher initial pressure, later cut-off and exhaust, and slightly later compression, as shown by the diagram. The following is a general description of the governor which controls the engines from which these cards were taken. The rocker arm passes through the hub of the pulley, but so far to one side of the centre as to move the eccentric pin

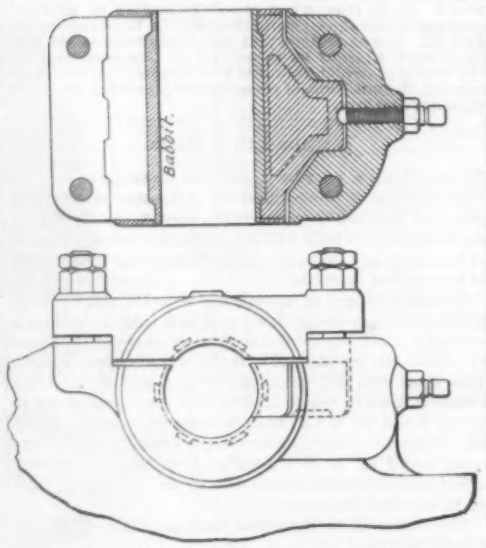


Fig. 2—Erie City Iron Works—Standard Journal.

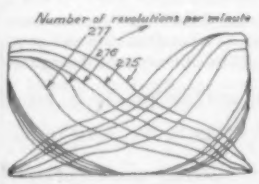


Fig. 3—Indicator Diagram Taken from 11 × 12 Automatic Engine—Steam Pressure, 90 lbs.

carrying the valve rod away from the lead line. The use of the rocker arm decreases the friction. The engine is classed as a high speed automatic electric light and street railroad type. It has a plain piston valve and a detachable steam chest which takes steam in at the centre. The design of journal box is shown by fig. 2.

The engine has long slides and crossheads with spot-babbitted bearings. There are double take-ups on the rocker arm, eccentric rod and valve stem, and heavy connecting rods. The engines are balanced to run steadily up to 350 revolutions.

Action of M. C. B. Association and of the States, Concerning Automatic Car Couplers.*

Colonel Haines made a brief statement of the origin and some of the characteristics of the present agitation, and then gave an interesting resumé of all that had been done on the coupler question down to 1880. Continuing, he referred to the first legislation on the subject, and summarized what he had previously said, as follows:

On March 19, 1880, eleven years after the matter had first been brought to the attention of the Master Car Builders' Association, the Massachusetts Legislature instructed the Board of Railroad Commissioners to investigate and report upon the subject of freight drawbars and couplers. Before referring to that report, let us restate briefly what the railroad companies had done.

At the third meeting of the Association, in 1869, Mr. F. D. Adams had recommended the adoption of a uniform height of coupler as a protection to the lives of railroad employés. At the next meeting a committee was appointed to report upon it, and in 1871 a standard height was adopted. Thus was the first step taken in the evolution of the safety coupler by the railroad companies themselves and at the instance of a railroad official. At the meeting in 1873 a committee reported upon the desirability of adopting a standard self-coupler, if one could be found worty of acceptance. In 1875 the same committee, after examining a great number of models, could find nothing that would meet the demand, and declared that the standard self-coupler should avoid the use of links and pins. In 1877 we find the Lake Shore & Michigan Southern experimenting with safety couplers on 100 cars, and in the same year a committee of yardmasters declaring that they did not care anything about self-couplers; that they wanted something to prevent them from being crushed between the cars; and accordingly the attention of the Association was directed for some years from self-couplers to deadwoods, apparently in response to suggestions from the yardmen, for, as Mr. Adams said, the Association felt in duty bound to listen to the appeals of these men. In 1878 the Association extended an invitation to the Yardmasters' Association to act in concert with their committee, which was to report upon the means for protecting train and yardmen from injury while in the performance of their duties, and at that very meeting the attention of the Association was called to the importance of uniformity. In 1881 the President of the Association asserted that none of these new inventions had sufficient advantages to place them in general use.

This, then, was the advance made in the search for a self-coupler at the time that the Massachusetts Legislature took action. Does this statement of facts bear out the charge made against the railroad companies that "There is no good reason to believe that the railroads will soon provide an adequate remedy of their own volition?" For 11 years they had been earnestly seeking for an adequate remedy. They had made a standard height for couplers, that the safety coupler might be made available. They had laid down the principle that all safety couplers must be without links and pins and couple interchangeably, and had been experimenting with the couplers presented to them for trial without being able to indorse any of them. What more could the railroad companies have done? What more had any one else done during these 11 years? And what did the Massachusetts Commissioners report? They said that they could not report satisfactorily on models, or even on trial tests—that the only valuable test was "by continued use in the actual course of traffic." They said that they would prefer to be guided by the action of railroad corporations; that "when 50 or more of such corporations adopt an automatic coupler, not as an experiment but as a standard, they do so in spite of the increased cost and trouble, and in spite of the natural prejudice against any new device. When, having tried such a device for a long time as an experiment, railroad managers order its universal use upon their roads, they give the strongest testimony possible in its favor. In justice to railroad managers it ought to be added that their backwardness in this matter is partly owing to the fact that, in the belief of many, no perfect device for self-coupling has yet been found, and still more that, in their opinion, most of the accidents are owing to the recklessness of brakemen and might be easily avoided. They cite instances where wooden and iron rods have been provided to avoid the necessity of going between freight cars, and where brakemen have declined to use them and have looked upon their use as cowardice. There is much truth in these statements;" and, after saying this, the report recommended a bill requiring the use of the Safford drawbar "or some other automatic coupler." In 1882 the Connecticut Commissioners recommended that the Legislature should require new cars to be equipped with automatic couplers. In 1883 the Massachusetts Commissioners hoped that the Master Car Builders' Convention would agree on some standard freight car coupler. In 1884 the Massachusetts Legislature passed an Act requiring that freight cars thereafter constructed or purchased, or when a coupler was repaired, there should be placed on them "such form or forms of automatic or other safety couplers as the Railroad Commissioners may prescribe.

On Sept. 25, 1884, the Board of Commissioners undertook to solve the problem. Just before that date, the Committee on Automatic Freight Car Couplers had reported to the Master Car Builders' Association advising that a committee of experts be appointed to be present at any trial of couplers, and noted as worthy of special mention certain drawbars, as follows: Archer's, Cowell's, United States, Janney's, Ames', Mitchell's, Wilson & Walker's, and the Conway-Ball Coupler. In the discussion that followed Mr. Wilder, of the New York, Lake Erie & Western said: "If the railroads of this country saw fit in their freight car service to apply the Janney coupler, the same as on the passenger cars, to all their freight cars, or the Miller hook, it would probably be a good thing to do." Mr. Wall, of the Pittsburgh, Cincinnati & St. Louis moved, "that it is the sense of this convention that any automatic coupler presented here should couple in a vertical plane." After a long discussion, the meeting voted to ask the roads to bear their pro-rata proportion of expenses of tests by Mr. Forney.

With this action of the Master Car Builders' Association before them, the Massachusetts Commissioners undertook to solve the car coupler problem themselves. They announced that they would "not order the use of any coupler which had not been tested in actual traffic." . . . Notwithstanding the sound views announced by the Commission, they did "prescribe" five different couplers that would not couple with each other. The railroad companies in the state were notified that by March 1, 1885, all new cars and all cars upon which new couplers were put should be provided with some form of the couplers so prescribed. Yet, in July, 1888, this Commission reported that only 5,000 of those "prescribed" couplers had been so applied.

Let us now return to the Master Car Builders' Association. At a public trial at Buffalo, Sept. 15, 1885, 42 automatic freight car couplers were tested and from this number 12 were recommended for further trial in actual service. In July, 1886, and in May, 1887, the Association undertook a series of competitive tests of power brakes on freight trains, and as a result of these tests it was clearly shown that link and pin couplers could not be used on a [long] freight train equipped with power brakes; so it may be asserted that it was not until 1887 that the idea of an automatic link and pin coupler passed definitely out of the minds of practical men.

In 1887, the Executive Committee reported "that this Association recommend as a standard form of coupling the Janney type of coupler; that the Association procure one of the present make by a committee appointed for that purpose, and then all other forms of couplers that will automatically couple to and with this coupler under all conditions of service are to be considered as within the Janney type and conforming to the standard of this Association." . . . The report was adopted, and it was

*From an Address on Compulsory Legislation about Safety Appliances, by President H. S. Haines, before the American Railway Association, New York City, April 13, 1892. The latter part of this address was given in the *Railroad Gazette* of April 15, page 275.

determined to decide by letter ballot as to the adoption of the Janney type of coupler as a standard. In 1888, the result of the ballot was announced as 474 in favor of and 194 against the adoption of the Janney type. The Executive Committee undertook to establish "the contour lines of this type, and to prepare drawings and templets showing the standard of the Association. The committee discovered that the contour lines of the Janney type were covered by patents of the Janney Co., and on June 17, 1888, that company agreed to waive all claims for patents on contour lines of coupling surfaces of car couplers used on railroads, members of the M. C. B. Association." This waiver was formally executed as applicable to freight car couplers.

It is important to remember that it was not until 1887 that the fact was established that link and pin couplers and power brakes could not be used together on the same freight train, and that it was not until 1888, just four years ago, that the essential principle of the vertical hook-coupler, which years of experiment had established as the only type practicable for a safety coupler, was made generally available by the generous action of the Janney Car Coupling Co. With these points secured, the road was made plain to the successful attainment of the result for which the Master Car Builders had striven for twenty years. What followed was mainly the filling-in of the details of the general plan. As the committee said, "The standard of the Association is, therefore, with the publication of these lines, definitely fixed; and it is in the power of any inventor or manufacturers of couplers, now or hereafter, to determine for himself whether his coupler will automatically couple to and with this standard, under all conditions of service. Invention can now be directed to improvements in detailed mechanism, in strengthening parts, and devising means for the protection of the couplers against the shocks and strains of service." This is the history of the evolution of the type of safety coupler which, at the meeting in 1888, was first called the Master Car Builders' Type. Well is that association of earnest railroad officials entitled to connect its name with this excellent work in the cause of humanity, and well may I add that this is their answer to the charge made at this late date that "There is no good reason to believe that the railroads will soon provide an adequate remedy of their own volition."

. . . Some organized action was therefore requisite on the part of the managing officers of the railroads to make effective the action of the Master Car Builders at their meeting in 1887. This was sought to be accomplished through this Association. At our semi-annual meeting in April, 1890, I called this matter to your attention. . . . At the fall meeting the Committee on Safety Appliances recommended the adoption of the Master Car Builders' Type of Automatic Freight Car Coupler as the standard of its members. Out of the companies voting, there were but two that dissented; and it may be said that in October, 1890, the Master Car Builders' Freight Car Coupler was recognized by the railroad companies of this country as the standard coupler, so far as it was possible for this to be done by their organized action.

Let us now see what had resulted from the action of the Massachusetts Legislature in 1884, which provided that by March 1, 1885, the railroad companies in the state should have equipped their freight cars with such forms of safety couplers as the Railroad Commissioners might prescribe. In September, 1884, the Board prescribed eight different kinds of couplers. In January, 1888, the Board reported that only 2,500 cars had been so equipped. In January, 1891, the Board reported that it had "in contemplation action looking to a revocation of some of the approvals heretofore issued," and that it had generally approved of all couplers of the Master Car Builders' Type.

This was virtually a confession of the failure of the compulsory legislation of 1884 to accomplish anything in nearly seven years, and an acknowledgment that all which had been accomplished up to January, 1891, was the work of the master car builders. Still Massachusetts did not lose faith in compulsory legislation, for in 1890 its legislature urged Congress to instruct the Interstate Commerce Commission to recommend the railroad companies to take some action in this matter and to suggest such legislation as might seem necessary or expedient. The Interstate Commerce Commission called a convention of the State Railroad Commissioners, which in May, 1890, resolved that the state legislatures should require freight cars to be equipped with "an automatic coupler of the Master Car Builders' type," and recommended Congress to take similar action. In the same month the Railroad Commissioners of Michigan withdrew the approval given in 1886 to seven different kinds of safety couplers, and authorized the use of "Janney, Dowling, Gould, Hinson and other couplers of the Master Car Builders' type." The action of the state legislatures and of the railroad commissions induced the President to refer to this subject in his message to Congress of December, 1890. The report of the Interstate Commerce Commission for the year ending June, 1890, gives 369 killed and 7,482 injured in coupling cars; but, accepting the President's figures as correct [2,000 killed; 20,000 injured yearly], it is disheartening to feel that our deliberate, organized action of October, 1890, should not have been recognized, although it was directly in line with his recommendation of December of the same year. The President stated the difficulty in the way of uniformity to be that of securing agreement as to the best devices. He says that this difficulty will only yield to legislation which should be based upon full inquiry and impartial tests, and pleads for the co-operation of all well-disposed managers and owners—co-operation which had been publicly, officially and efficiently given two months before the date of his message to Congress.

In March, 1891, there was another meeting of the State Railroad Commissioners, at which a committee was appointed to present a bill to Congress for hastening and insuring the equipment of freight cars with uniform automatic couplers, and, before presenting a bill, "to hear representatives of organizations of railroad officials or employés." In response to this your Executive Committee signified its desire to act in harmony with the National Convention of Railroad Commissioners, and suggested a conference in time to properly present the whole subject at our October meeting. Nothing came of this proposition, and the Committee of Railroad Commissioners gave the promised hearing in New York city on Nov. 10, 1891, at which your Executive Committee and Committee on Safety Appliances were present, as also a committee from the Master Car Builders' Association, to inform the Committee as to the action already taken by our associations and to express an opinion adverse to the necessity for compulsory legislation. We heard nothing as to the results of this hearing, except that the Committee had been unable to agree upon a bill, a report which we found to be true when we were invited to another hearing by the same Committee held in Washington on Feb. 14. It was evident that the Committee could not agree upon a bill to be presented to Congress, and at the hearings which followed this Committee failed to appear, though some of its members presented their individual opinions.

The Strength of Struts.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The method of determination of the correct strength of struts has not been generally agreed on. I offer a demonstration which will determine the actual strength of struts of any shaped cross-section of any length, and of any kind of material.

To show the lack of knowledge 20 years ago by engineers who made bridge designing and bridge building a specialty, I present a cross-section of one of the struts of a 300-ft. drawbridge, 27½ ft. between centres of pins. This strut was 60 ft. from end of span and 90 ft. from centre of draw or centre of pivot pier (each arm of drawbridge being 150 ft.), so that it supported about 36,000 lbs. of weight of bridge every time draw opened. The strut bent 2 in. at the middle of its length. Several other struts, in both arms of the draw, also bent, and all in the same direction.

The bridge was a Post truss, built in 1871 or 1872, and rebuilt in 1885.

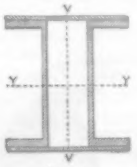


Fig. 1

Fig. 2

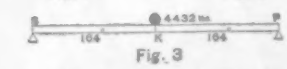


Fig. 3

The area of section is 7.875 sq. in. The centre of gravity of half the section is 1.512127 in. from neutral axis $V\,V$ and 2.39288 in. from neutral axis $Y\,Y$. The moment of inertia of the half section is 14.57382 and the square of radius of gyration is 3.7091283 and $\sqrt{3.7091283} = 1.923.7$ in., the radius of gyration about the neutral axis $V\,V$, and this is the distance from neutral axis $V\,V$ to centre of stress of the half section in compression and to centre of stress of the half section in tension, and $1.92357 \times 2 = 3.84714$ in. is the distance between the centres of stress of compression and tension.

The plate iron used in the construction of these struts probably had an ultimate resistance to compression of 36,000 lbs. per sq. in. of section, in short pieces with square ends, firmly fixed and evenly loaded, but these struts had pins at both ends which probably reduced their resistance to 24,000 lbs. per sq. in. The section of strut has an area of 7.875 sq. in., one-half of which in a bent strut would be in compression and the other half in tension. The load that half the area would support, if there were no bending, would be $3.9375 \times 24{,}000$ lbs. = 94,500 lbs. If we suppose this strut laid horizontal, supported at both ends and loaded at the middle, the section at right angles to neutral axis $V\,V$ being vertical, the ultimate resistance of the strut acting as a horizontal girder would be 94,500 lbs. × 3.847 in. = 363,542 in. lbs., as shown by fig. 2.

The resisting moment being 363,542 in. lbs., the concentrated load at K to produce a bending moment at K = 363.542 in. lbs. would be 4,432 lbs., or an upward reaction at S or $P = \frac{4{,}432}{2} = 2{,}216$ lbs., and 2,216 lbs. × 164 in. gives a bending moment at K = 363,424 in. lbs., equal to the moment of resistance.

This will be the ultimate resisting moment of strut when vertical as well as when horizontal, or in any position between the vertical and horizontal. A vertical strut is loaded at top end A and has an equal reaction at the bottom end S, so that every section between the two ends is equally pressed, and consequently every part of strut that is under compression will contract its length equally (in a bent strut the contraction will be on the concave side of curve), and the material on the convex side will be uniformly extended from end to end, so that the shortening on one side and lengthening on the other side of strut is uniform, therefore the curve formed by a bent strut must be the arc of a circle.

We have found that an upward reaction of 2,216 lbs. acting at right angles to $S\,P$ at P, with a concentrated load of 4,432 lbs. at centre K, would just crush the strut acting as a horizontal girder, if we consider $S\,P$ 328 in. long as the radius of a circle, as shown by fig. 3.

SP is the strut laid horizontal, and SA is the same strut raised into the vertical position by describing the quadrant of a circle PP^1A.

In the horizontal position, the strut cannot transfer any end load from P to S, but by raising the strut, it can carry some end load from P to S. That end load will increase from nothing at P, as the angle ASP decreases, until the strut reaches the vertical position SA. We have found that an upward reaction at P_1 = 2,216 lbs., acting in the vertical line PB, and multiplied by half the length of strut (164 in.) will produce a bending moment at K = 333,424 in. lbs. This is equal to the ultimate moment of resistance of the strut in any position in which it may be placed. Now, if the power at P, required to describe the curve PP^1A, is changed from the vertical direction PB to the direction PP^1A, the power will be increased in the proportion of the radius SA to the diameter AP of square $ABPS$, or as 328 in. to 463.86 in. This proportion will increase the bending moment at K, and reduce the ability of the horizontal strut to support the load at centre K. The power needed to prevent the weight placed on top of strut at A, from describing the curve AP^1P, will also reduce the supporting power of vertical strut SA, in the ratio of diameter to length of strut, or as 463.86 to 328. We have shown that the resisting moment of strut, in any position is equal to 363,424 in. lbs. Then the strength of the vertical strut will be as 463.86 : 328 : : 363,424 : 256,980 in. lbs., and this divided by the distance between the centre of compression and centre of tension, which is 3.847 in., gives $\frac{256{,}980}{3.847} = 66{,}800$ lbs., the ultimate resistance of vertical strut SA. The strut under consideration, of which fig. 1 is a section, actually supported a dead load of about 36,000 lbs., every time the draw span was swung off its end supports. The crushing load of vertical strut is 66,800 lbs., and the actual load is about 36,000 lbs., so that the factor of safety was 1.85. If the actual load at any time had reached 66,800 lbs., the strut must collapse and the span with it. The iron in this strut might be so arranged as to increase the strength of strut 1½ times without increasing the quantity of iron materially. The formula used by engineers for calculating the strength of struts, is Gordon's formula or some modification of it. This formula is based on the assumption that part of the strain on strut is uniform and the other part variable. The fact is that no part of the strain is uniform, but all the strain is variable, so that the assumption is not correct, and therefore the formula is not correct.

The ability of a long vertical strut to support an end load at top end A, is in the proportion of the length of the diameter to the side of the square, or as 463.86 to 328 $= \frac{328}{463.86} = 0.707$. In the case under consideration, the load at A is 94,500 lbs., which would be the crushing load of a vertical strut, or rather would be half the crushing load if prevented from bending, but as the strut would bend under a load of 94,500 lbs., its ultimate resistance is reduced to 94,500 lbs. × 0.707 = 66,810 lbs.

The iron used in building a strut should be placed as far as possible from the neutral axis, with the restriction that no unsupported plate will have a greater width than 30 to 35 times its thickness. The iron in strut will then be capable of producing its full resistance. This drawspan bridge had a factor of safety of five for all its parts, except its struts, which had only a factor of 1.85. The number of bridges in the same or nearly the same condition, are many.

A formula established on correct scientific principles which will fix the exact strength of struts, should be interesting to engineers, bridge builders and bridge owners. The demonstration shows that a vertical strut will support 30½ times as great a load at its top, as the end reaction when laid horizontal or 2,216 × 30½ = 66,796 lbs.

If we have a strut the strength of which we wish to ascertain, all we have to do is to find what end reaction would crush the strut when laid horizontal, supported at both ends and loaded at the middle, then take half the crushing load at the middle, and multiply the half crushing load by 30½, the result will be the crushing load of strut when raised into the vertical position. For instance, we find that 4,432 lbs placed at centre K, would crush the horizontal strut under consideration. The half of 4,432 lbs. is 2,216 lbs., and 2,216 × 30½ = 66,796 lbs. It is evident that when a strut laid horizontal with its least diameter vertical will be crushed by a small load at the middle of its length, then the same strut when vertical, will fail under a corresponding small load.

If the factor of safety for the other members of a bridge is 5, the factor for struts should also be 5. Then find the greatest probable load that a strut will have to support, and multiply this greatest load by 5. The strut discussed supported 36,000 lbs. of dead weight of bridge, then 36,000 × 5 = 180,000 lbs. The strut should be designed to support this load. I have estimated the ultimate resistance of the iron in a strut with pins at both ends equal to 24,000 lbs. per sq. in. of section, but when the strut is long, 24,000 lbs. per sq. in. is a greater ultimate strain than the iron can sustain, it must be reduced in the proportion of the diameter to the side of square, or as 463.86 : 328 : : 24,000 : 16,970 lbs. per sq. in., the crushing strain. Now, the load on top of strut is supposed to be 180,000 lbs. and $\frac{180{,}000}{16{,}970} = 10\frac{6}{10}$ in. the area of section. This area of iron scientifically arranged will support a load of 36,000 lbs. with a factor of 5. This strut has 1½ times as much iron as the strut discussed, and nearly three times the strength.

M. MCCABE, Civil Engineer.

The Kalamazoo Railroad Velocipede.

The Kalamazoo Railroad Velocipede & Car Company's new steel velocipede shown herewith is made for speed and convenience in handling under all circumstances, particularly in cases of emergencies. The frame is made of spring steel and malleable iron and so thoroughly trussed that it cannot get out of line. The frame con-

Fig. 1—Kalamazoo Railroad Velocipede "No 18-2."

sists of base bars in which the axis of the main wheels, which run on one rail of the track, have bearings, and of upwardly extending yokes, to which truss rods are attached; the truss rods extending obliquely downward at the ends through sockets attached to the side of the base of the frame. By tightening nuts the frame is so thoroughly trussed that quite light material may be used and still make a durable frame.

This car is propelled by the hands and feet, the motion being the same as rowing. While it can be used to good advantage by two men, it can also be handled and operated by one person. It is so constructed and the weight so balanced that it cannot tip to one side when running over sharp curves at high speed. It can be run backward as well as forward on straight and level track, which is often of great advantage. The axles of driving wheels revolve under anti-friction rollers 4 in. in diameter. The rollers are fitted with brass boxes and run on ⅝-in. hard machinery steel journals. It is fitted with an effective brake that operates on the rear driving wheel.

Another important feature is the adjustability and folding of the guide or brace wheel arm. The end of this arm is hinged to the frame, and when swung around and locked in the spring catch against the side of the frame (as shown in fig. 2), the velocipede can be easily handled by one person and placed in a baggage car or on the platform, or can be readily run into a storehouse like a wheelbarrow by raising one end and pushing it forward on one wheel.

The end of the brace rod attached to the trailing arm is held firmly in a socket attached to the frame of the car, and is adjustable to suit the convenience of the operator and to secure perfect safety from derailment when traveling on steep grades or sharp curves.

The gearing is composed of sprocket wheels and a steel chain, and is geared in the proportion of four to one, making it probably the speediest, and, in connection with the anti-friction rollers, the easiest running velocipede in the world. Steel springs are placed under the seats (not shown in cut), enabling the operator to ride comfortably when running over rough track.

TECHNICAL.

Manufacturing and Business.

The Berlin Iron Bridge Co., of East Berlin, Conn., has taken the contract to build a producer building for the Solvay Process Co., of Syracuse, N. Y. The building will be 30 ft. wide, 100 ft. long and three stories high, built entirely of iron, even the floors being made of plate iron.

The Lunkenheimer Brass Mfg. Co., of Cincinnati, is preparing for the World's Fair an exhibit of specialties in valves, sight feed lubricators, oil and grease cups, etc., and a line of brass and iron goods. The company is crowded with orders, and has large contracts for special work for the new United States cruisers.

Fairbanks, Morse & Co., of Chicago, report a large demand for track jacks and hand cars. Orders have been received in the last few months from nearly 250 railroads. Large orders have been recently received from the New York Central, Pennsylvania system, Illinois Central, Mexican Central, Chicago, Milwaukee & St. Paul, Chicago & Northwestern, Chicago, Rock Island & Pacific, and Louisville & Nashville. The section car alluded to is with the pressed steel wheel, made out of one plate, ¼-in. tough metal, without seam, joint, weakening angle or bolt.

The Moses P. Johnson Machinery Co., of St. Louis, has taken the exclusive agency of the Field feed-water purifier for Missouri. The company has recently equipped with its device one of the large iron steamers being built by the Detroit Dry Dock Co., of Detroit, Mich.

The Chicago Tire & Spring Co, is making extensive additions to its works at Melrose, Ill., including a two-story brick machine shop 80 × 40 ft. It is also putting up a foundry 176 × 136 ft., which will contain two 10-ton open-hearth steel furnaces fitted with hydraulic cranes, lifts and all modern improvements.

The Lima Locomotive Machine Co., of Lima, O., was chartered in Ohio last week. The capital stock is $300,000.

The Ross-Meehan Brake Shoe Foundry Co., of Chattanooga, Tenn., will soon have its plant operating to full capacity.

O'Connell & Rogers, extensive dealers in railroad, mining and mill supplies at Chattanooga, Tenn., have made application for a charter.

Iron & Steel.

The Taylor Decarbonized Iron Mfg. Co., of Montreal, has been chartered, with a capital of $150,000, for the purpose of working the Taylor process for decarbonizing iron. The charter members are Frank Gilbert, Frederick Workman, Thomas Costigan, James Robert Walker and F. D. Taylor, Mining Engineer, all of Montreal.

The Pennsylvania Steel Co. announces a semi-annual dividend of six per cent., three per cent. in cash and three per cent. in stock, payable April 14.

The Harriman (Tenn.) Rolling Mill has closed a contract to furnish to the Queen & Crescent Railroad 25,000 pairs of steel angle plates.

The Shelby Steel Tube Co., of Shelby, O., has increased its capital stock $100,000 preparatory to erecting two more shops, which, it is said, will give a total capacity of 7,000,000 ft. of tube annually.

The Lukenstein Steel Co., of Coatesville, Pa., recently started to make its own steel for boiler plates, having put in six new open-hearth steel furnaces.

The plant of the Henderson Steel & Mfg. Co., of North Birmingham, Ala., has been sold under foreclosure. The property was purchased for $4,748. This plant was completed early in 1888, and has a capacity of 50 tons daily.

New Shops and Stations.

The Pittsburgh Locomotive Works has begun the erection of a new machine shop at its works on Beaver ave nue, Allegheny. It will be built of brick, with iron framework, and will be 365 × 125 ft. The firm is also building a blacksmith shop, 365 × 100 ft., with an 80-ft. wing, which will be used for a hammer shop.

The Philadelphia & Reading car repair shops, at Wayne Junction, near Philadelphia, recently destroyed by fire, will be rebuilt at once. Plans and specifications for the new building have been prepared. The new building will be of about the same dimensions as the one destroyed.

The contract for building the New York Central shops at Depew, near Buffalo, has been let to W. R. Haven, of Buffalo. Part of the buildings will be erected by September, but the plant will hardly be ready for operation before December.

The plans for the new shops of the Gould Coupler Co. at Depew, are now being made, and it is expected that they will be built this season. The plans provide for two separate buildings, one a malleable iron plant with a capacity of 600 couplers a day, the other for steel, with a capacity of 900 steel knuckles a day. The proposed malleable iron plant is to consist of an annealing room 80 × 100 ft., a machine shop 50 × 125 ft., including two pattern shops, a blacksmith shop and other rooms. The steel plant molding room will be 80 × 150 ft., the pouring room 80 × 300 ft., and the annealing room 40 × 160 ft.

The Kenwood Bridge Co., of Chicago, has the contract for the construction of the steel and iron train shed which is to cover the tracks of the new Illinois Central station. It will be 175 ft. wide, 500 ft. long, and will cover nine tracks. The contract specifies that the work must be completed on July 1. The steel work is now being constructed at Cambria and Cleveland, and it is expected that the foundations will be ready to receive the superstructure about June 1.

Plans have been prepared by G. B. Nicholson, Chief Engineer of the Cincinnati Southern, for a station at Lexington, Ky., which will be two stories in height, 28 × 105 ft., and will cost $12,000.

M. C. B. Drawbar Standards.

The committee of the Master Car-Builders' Association has issued a circular to manufacturers of vertical plane couplers setting forth its views regarding the necessity of securing uniformity in M. C. B. standards and outlining a standard of excellence in material and design. The substance of this circular follows.

For the accurate determination of the contour lines the gauges now made by the Pratt & Whitney Co. will be used. These gauges have been determined by the Executive Committee in pursuance of the action of the convention and the instructions transmitted by the convention to the committee. The standards of length, thickness and other dimensions adopted by the M. C. B. Association, and illustrated in the announcement of Aug. 1, 1891, must be strictly conformed to. The committee further recommends the pocket or U-shape fastening in lieu of the tail bolt.

The committee proposes the following specifications for M. C. B. drawbars:

1. Weight. Drawbars, including knuckles and locking attachments, should weigh 210 lbs. or less; they must not weigh over 220 lbs.

2. All drop tests will be made on a solid masonry foundation. The knuckle of the bar to be tested will be in its closed (locked) position. The bottom of the drop will be flat, so as to represent the blow from an opposing closed M. C. B. drawbar.

3. Pulling Test. Drawbars must be constructed so that when subjected to a pulling test they will stand not less than 100,000 lbs.

NOTE.—In view of the rebound which draft rigging is subjected to after an emergency application of brakes, the committee will consider increasing this limit to 110,000 lbs.

4. Drop Test. Drawbars should stand the following drop test: Weight of drop, 1,040 lbs.; three blows at 10 ft., two blows at 15 ft. The drawbar or knuckle must break into two or more pieces before it is considered to have failed under this test. The cracking of the parts will not be considered as a failure.

5. In subjecting bars to tests 3 and 4, the drawbars and knuckles will be considered separately, viz.: A failure of one will not condemn the other.

These specifications are not supposed to be entirely accurate, but they are offered by the Committee as a step in the direction of adopting specifications which will make a standard of excellence in M. C. B. couplers.

The Committee announces that it will hold a meeting on Tuesday, April 26, at Hotel Anderson, Pittsburgh, Pa., at which time the members will be glad to meet manufacturers of couplers for the purpose of discussing these specifications, and to receive couplers with a view to their being subjected to these tests. JNO. S. LENTZ, J. M. WALLIS, G. W. RHODES, Committee.

Highway Crossing Signals in Chicago.

The Pennsylvania Steel Co. reports that it has a large contract for the erection of its highway crossing alarm signals (magneto-electric), to be located at points where street car lines cross the Pittsburgh, Fort Wayne & Chicago tracks in Chicago. These signals will be used as an auxiliary safeguard, the crossings being provided with gates.

Fig. 2—Kalamazoo Railroad Velocipede.

RAILROAD GAZETTE

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The subscription price is $4.20 a year in North America, and $6.08 in foreign countries.

EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

The Memphis bridge, which is to be opened next month, is the only structure across the Mississippi south of St. Louis, and it is 1,200 miles (by river) from St. Louis to the mouth of that great, crooked and muddy stream. Nor is there anything which can properly be called a railroad crossing in all that distance except at Memphis, Arkansas City, Vicksburg and New Orleans. This of itself is an indication of the enormous difference of the trans-Mississippi country north and south of Cairo in traffic production. Not only are bridges numerous north of Cairo, but they are kept busy. One would suppose that the vast territory west, northwest and south of Memphis would send an enormous traffic over the new bridge; bnt we must not imagine that the traffic will be at all in proportion to the territory. The railroad system, whose eastern terminus is at Memphis, is comparatively small. It is true that it is possible to send cars there from the whole of Texas and the whole of the Northwest; but the actual termini of the Texas lines are at Galveston, New Orleans and St. Louis. The Arkansas lines are also very largely St. Louis railroads, and actually it is not the east-and-west business, but the north-and south business—more exactly, the northwest and southeast business—which has been the chief occasion for building the bridge, which is the property, substantially, of the Kansas City, Fort Scott & Memphis Railroad Company. Once built, however, we should expect that the traffic of other railroads west of the Mississippi would add materially to its support. However imperfectly developed, so great a territory should afford a very large traffic for the one bridge south of Cairo. And the cost of such a structure on the lower Mississippi, the small number of places where there is any occasion for a bridge, and the situation of the railroads in that part of the country make it improbable that there will be hereafter, at least for a very long time, any other bridge for a long distance above or below Memphis.

The Illinois Central has awarded a contract to the Hall Signal Company for the equipment of its road between the terminus (Chicago) and Kensington, about 15 miles south, where the Michigan Central trains enter upon the Illinois Central tracks, with Hall automatic block signals. There are four main tracks throughout this distance, and some of the way there are six, seven or eight tracks. The number of tracks to be signaled is equal to an average of seven for the whole distance, or 105 miles of track. The signals are in most cases to be placed on steel bridges, spanning the entire roadway. In equipping eight tracks with block signals the Illinois Central officers show that they fully appreciate the magnitude of the traffic that is likely to be thrown upon their line between the terminus and Jackson Park next year. While two of the tracks at least will have to be used by freight trains, it will doubtless be found practicable to suspend freight traffic for an hour, or possibly longer, morning and evening, at least on days of specially heavy passenger traffic; so that the newspaper statements that the road will be able to start trains for the World's Fair every half minute are not far out of the way. A train every two minutes on each one of four tracks would do it, and the block sections will not need to be unreasonably short to run with that interval, provided the engines are powerful enough to "pick up" their trains quickly. It might be worth while to establish special starting platforms, if possible, at a point where the grade is descending, in order to enable them to do this. Where all the block sections are short, the maximum of express-train traffic is limited by the length of the first section, and it is, in some respects, undesirable to make this less than 1,000 ft.

The Hall Signal Co. has also been awarded a large contract by the New York Central, that company having decided to use the Hall automatic wire-circuit signals on the freight tracks between Albany and Buffalo, according to the general plan heretofore announced. Most of these signals will be located at points near the termini of freight divisions, where the distances between the telegraph offices (towers) which work the manual block system are too long for convenience. The sections under the manual system are, it will be remembered, about three miles long. On either side of a large yard, such as that at De Witt, for instance, the freight tracks on one of these sections will be divided into three or four short sections and the trains will be guided by the automatic signals. Something over 100 of these will be erected. The automatic signals put in by the Hall Company near Peekskill some time ago are to be taken out, so that there shall be a uniform system throughout the main line, and these Hall signals will be used to equip the line between East Albany and Troy, a distance of six miles, double track.

The two important installations here mentioned, with that on the Chicago & Northwestern heretofore announced, will give disc signals a standing which they have not before had, and their use on these roads will afford ample experience with that form and with glass-covered signals, thus giving an opportunity of settling, by the results of actual tests on a large scale, some of the questions regarding the relative merits of these and of ordinary semaphores, which have heretofore been decided without careful investigation, or have been regarded as too speculative to demand thorough study. The Hall disc signal, one of the marked characteristics of which is the uniform and well defined background provided for each signal, is now made in a form somewhat different from that formerly employed. The red cloth disc is about 4 in. smaller in diameter than the opening in the case through which it is seen, so that it is surrounded by a ring of white, thus making the contrast between the disc and the dark background much more effective. In this way an unmistakable signal is produced, even to a color-blind person, the signal becoming in fact a form signal. The distant signals to be used with this system on the Chicago & Northwestern (where all-clear is indicated by green) will have discs with the main portion of their face green, but with two white strips (at right angles to each other) across the face of the disc. At night this distant signal will be similar to that employed by the Northwestern in some of its interlocking signals; caution will be indicated by a red and a green light, side by side, above the disc, both being illuminated by the same flame, by means of a mirror placed in the back of the lantern. When the signal changes to all-clear the red light is covered, leaving the green alone exposed.

Among the buyers and sellers that we see in railroad circles there are four kinds of extremists; the affable and willing salesman who is ready to guarantee to meet an impossible specification, the sarcastic salesman who scorns those buyers who attempt in any way to regulate the material they are buying, the buyer who relies on his specifications as infallible, and the buyer who shuts his eyes, and relies solely on the brand of the goods—that is, on the reputation of maker. These men are extremists because their several policies are irrational, and will fail to produce the only right result, viz., the best value for money expended. The mean of these extremes is probably the most economical policy to follow. The real value of a specification should be estimated according to the extent of the practical experience on which it is based, and the signification of a brand should be measured by the character of the material as shown by repeated tests and practical trials. It is not desirable to rely solely on specification, and still less desirable is it to rely solely on a brand or a maker's reputation. Buyers are coming to understand these points better than heretofore, and many manufacturers who formerly were comparatively free from competition now have to work hard to sell on reputation alone. There is nothing which causes so many disputes and so much ill feeling between superintendents of motive power and purchasing agents as this one question of specification or brand. Doubtless most of our readers well understand the reasons that lead to the foregoing conclusions, and we need not enter upon a more extended explanation of them; but every one interested will, nevertheless, like to see what well known men think on the subject, and we therefore call the reader's attention to some letters on "Specification versus Brand," which are printed in another column of this issue. Recent discussions have brought this subject prominently before the officers of three large roads, and their experience, with that of other prominent men who purchase hundreds of thousands of dollars worth of material yearly, is epitomized in these letters, which will be entertaining reading to all, whether they favor specifications or not. They will be specially instructive to those who need a stronger conviction and a little more "backbone" to enable them to follow the best practice, which is to decide as to the nature of what is wanted and buy on merit. The reader of these letters will doubtless recall instances where material formerly bought on brand has now been replaced by other material without any special reputation, but which has been sold on pure merit. Anyone reviewing a list of makers of such railroad material as wheels, axles, boiler steel, tubes, staybolts, lubricating oils, cylinder oils, car couplers, springs, etc., will doubtless find, as we have, that firms formerly considered to be makers of the highest grade have been replaced, on roads that buy on specification, by new manufactories; and it is probable that the reduction in prices during the past few years has been more or less directly brought about by this increased dependence or specification, which permits a meritorious product to find its proper place in the market.

Riveting Locomotive Boilers.

It seems to be clearly evident from the results of service that power riveters and the development of the machinery used for locomotive boiler construction have not kept pace, in the last two or three years, with the increase of pressures and dimensions. Two or three failures which have occurred lately will illustrate what we mean. Some locomotives built for a Western road and warranted to stand 180 pounds boiler pressure were found to be weak in the crown sheets, and the pressure had to be reduced. In another case some new locomotives leaked so badly that they had to be run for a long time without jackets, until the sediment stopped up the leaks. In another, the rivets were found not to fill the holes: the sheets were so thick and the rivets so large that the power riveter used could not expand the rivets so as to fill the rivet holes.

The machinery used for building locomotive boilers in this country is being rapidly changed for more powerful apparatus; but in the interval we have had a lesson in the cases of from 150 to 200 engines that deserves attention. Three years ago a $\frac{7}{8}$-in. rivet was large. Now it is not uncommon to use 1$\frac{1}{4}$-in. rivets. The sheets were formerly from $\frac{7}{16}$ in. to $\frac{1}{2}$ in. in thickness. They are now from $\frac{5}{16}$ in to $\frac{7}{8}$ in. The riveters formerly used could drive $\frac{7}{8}$-in. rivets and drive them well, and could make a fairly good job with $\frac{1}{4}$ in., but they fail entirely with 1-in. rivets and thick sheets. The pressures commonly prescribed for compound engines are now about 180 lbs., with a decided tendency to even higher pressures, say 200 lbs. The diameters of boilers have been increased from 56 in., heretofore called a large size, to 74 in. for the largest size now used. A riveter to properly drive rivets for such boilers as this weighs from 75 to 100 tons, and is a large machine, but it must be used if one would do really good work.

The recent trouble with certain large boilers carrying high pressures has not wholly arisen, however, from the inadequacy of the riveters, but to some extent from a lack of appreciation of the problem on the part of the boiler makers who lay out the sheets. The thin sheets formerly used could be stretched or expanded in setting up the boiler, so as to make a tight joint even if the shells were not quite the same size, but with the thick sheets this is impossible. The shells must accurately fit each other if a perfectly tight joint is to be made. In one boiler that we have examined it was clearly evident that one of the shells was smaller on the outside than the inside diameter of the shell which fitted over it. The riveter had driven the rivets, but had failed to stretch the sheets to make a tight joint. The boiler, of course, leaked and the calking process simply resulted in changing the point of leakage from one place to another. No sooner would one part of the circumferential seam be made tight by calking than another part began to leak.

All smaller sizes, and, in fact, our average locomo-

tive boiler, is now built better than ever before. The tools for completing them are better adapted to the work than they have been. More attention is paid to the character of the material, the accuracy of laying out the work, the driving of the rivets and the location of screw stays; but the unusual boilers for heavy and for compound locomotives have proved too large for the old machinery, and it is evident that more powerful riveters must be used, and more accurate work must be done in laying out.

There is probably no class of machines which has been so rapidly increased in size during the past ten years as the locomotive, and large sums of money have necessarily been expended in increasing the capacity of the tools and the power of the machinery used in making engines. Those locomotive shops that have not kept pace with the advance in dimensions and weight of details of locomotives are now working under difficulties, both in the cost of production and as regards quality of the work. The boilers give more trouble in such shops than other parts, as their dimensions have increased more rapidly than other details. The increased size of boilers has resulted directly from a better understanding of the causes of loss in locomotive engines. The active discussion of the deficiencies of locomotive boilers has brought an appreciation of their defects, and as a result the one great essential, namely, large dimensions, has finally received the attention it deserved, and the boiler departments of locomotive works are therefore somewhat naturally behind the present demands. The bending rolls, the shears, the riveters, and annealing furnaces, are not quite equal to the new dimensions, and the quality of the larger sizes of boilers, perhaps more particularly in the railroad shops, suffers accordingly. What is now needed, and what is being rapidly supplied, is a larger size of the tools just mentioned. The tool builders have responded to this demand and we now have available what is probably the most complete, quick-acting and "handy" set of boiler shop machinery that is made in the world; and those who have had trouble with some few large boilers should take encouragement and not pronounce against the feasibility of higher pressures and larger dimensions until the new machinery has had a chance to show what it can do.

Secret Rebates.

The Chicago *Tribune* has gathered and printed a considerable quantity of circumstantial evidence tending to show that various railroads are paying secret rebates to favored shippers. This matter was published in that paper last Saturday, and is reported by our Chicago correspondent in this issue. The *Tribune* some weeks ago interviewed prominent State officials and shippers throughout a large territory west of Chicago and found a universal belief that secret manipulation of freight rates was very general, and names of favored shippers and the roads that favored them were given, but no definite evidence of law-breaking was produced. The introduction to the present article states that the evidence now published is to meet the argument, made by the defenders of the Interstate Commerce Commission, that the impossibility of securing evidence is the reason why law-breakers like those accused in the former article have not been prosecuted.

We are bound to say, however, that most of the letters and other documents now presented afford only presumptive evidence. They would probably fail to convict any person in a court, and the claim that additional or more convincing evidence is in possession of the proprietors of the newspaper is made in language which seems to be carefully guarded in its terms. There is no doubt that extensive favoritism, of a grossly unjust character, has been perpetrated by means of allowances for lighterage, cartage and commissions: but it is also true that allowances of this kind are in many cases justifiable, at least partially, and the difficulty of proving criminality is therefore but little lessened by the facts which the *Tribune* brings out. There is one quite definite piece of evidence, however, and that is the facsimile of a letter written by an agent of the West Shore, in which he states that he has promised a consignee 1 cent per 100 lbs. rebate on certain prospective interstate shipments. Among the other letters printed is one mentioning a rate of 1½ cents a mile as being paid by one road for shippers' refrigerator cars. The introduction to the article states that unprincipled persons offer to the newspapers forged letters purporting to give evidence against railroad officers.

The *Tribune* also interviewed Interstate Commerce Commissioner Knapp, who says that although the energies of the Commission have heretofore been directed chiefly to the elucidation of the law, "the disposition at present is to adopt a vigorous policy looking toward the punishment of offenders." The first requisite to carry out that kind of a policy is a liberal appropriation. The Commission's solitary agent is still working to make up cases at Omaha and elsewhere, but he needs a good deal more power and more assistance than he has thus far had.

But while the *Tribune* has done little in the way of furnishing evidence which will technically convict lawbreakers, it must be credited with having done a good thing, looking at the matter broadly. There is no doubt that hundreds of shippers have been enjoying unfair advantages at the hands of the railroads. This evidence is rather old, and the officers of the law probably had this or other as good evidence before, but it is a good thing for the *Tribune* to get it before the jury—the public—even if the judge in his charge says that it must not be considered. Public opinion, like ordinary juries, makes up its verdict on all the evidence which the lawyers have managed to squeeze in, without much regard to what the court says about technical reasons for excluding some of it. The essential injustice in all these secret allowances lies in their secrecy. Whatever may be said about other sections of the Interstate Commerce law, that requiring publicity of rates must be regarded as perfectly just. But Congress seems to be no nearer finding a way to equitably administer that section than it was five years ago.

Books on Railroading.

II.

From the standpoint of the economist and legislator the most comprehensive work on railroads is Hadley, "Railroad Transportation, its History and its Laws," New York, 1885, G. P. Putnam's Sons. This book gives a general survey of railroad history and legislation in different countries, and an account from the economist's standpoint of the principles involved in the making of railroad rates. An excellent work, dealing with somewhat the same matter, but of a narrower range, is Acworth, "The Railways and the Traders; A Sketch of the Railway Rates Question in Theory and Practice," London, 1891, John Murray.

These are the leading books which deal with railroad business from the standpoint of the political economist, and are essential to an understanding of the principles connected with railroad rates. Somewhat the same ground as that of Mr. Acworth's book is covered by a work of Kirkman's, which has just appeared, "Railway Rates and Government Control," Chicago, 1892, Rand, McNally & Co. Other books on railroad management of a more popular character are C. F. Adams, "Railroads; Their Origin and Problems," New York, 1878, and E. P. Alexander, "Railway Practice," New York, 1887, both published by G. P. Putnam's Sons. The reputation of the authors of these books is such that they need no commendation from us. Parts of Scribner's "American Railway," New York, 1888, have a value much more permanent than that of the ordinary magazine article or popular gift book.

Hudson, "The Railways and the Republic," New York, 1886, Harper & Bros., is a well written work, which made a great impression at the time, but the writer's imperfect knowledge of many details of railroad operation and finance made his conclusions more or less misleading. The same criticism may be applied in equally marked degree to two works of Bonham—"Industrial Liberty," 1886, and "Railway Secrecy and Trusts," 1889, both published by G. P. Putnam's Sons. Jean's "Railway Problems" has been alluded to in a previous article.

Among the many pamphlets and monographs on the rate question we can only select a few.

Alexander, "Reply to Questions of New York Chamber of Commerce," 1880.

Atkinson, "The Railway and the Farmers," published, with other essays, under the title "The Distribution of Products."

Fink, "Report on the Adjustment of Railroad Transporation Rates to the Seaboard," New York, 1882.

Vining, "The Classification of Freight, and the Principles on Which It Is Based," Chicago (the *Railway Review*), 1884.

Seligman, "Railway Tariffs and the Interstate Commerce Law," reprinted from the *Political Science Quarterly*, 1887.

Taussig, "A Contribution to the Theory of Railway Rates," Boston, 1891, George H. Ellis.

The various writings of Judge Cooley and the reports of the Interstate Commerce Commission to Congress, besides the celebrated Louisville & Nashville decision, deserve mention in this connection.

All these discussions deal primarily with freight traffic and freight rates. Passenger traffic economy can hardly be said to have advanced far enough in the United States to develop a literature of its own, but Lee's "Local Passenger Traffic" (the *Railroad Gazette*), now out of print, was suggestive and probably had some effect. Most of the American discussions of recent European experiments in passenger reform are more or less untrustworthy in their results. Foxwell & Farrer's "Express Trains, English and Foreign," London, 1889, Smith, Elder & Co., is interesting, especially the part written by Farrer.

From the narrower standpoint of the legislator, two books are worthy of special mention: W. D. Dabney, "The Public Regulation of Railways," New York, 1889, G. P. Putnam's Sons; and Farrer, "The State in Its Relation to Trade," London and New York, 1883, Macmillan & Co. The former of these books deserves to be far more widely known than is the case at present. It is the work of an able man, familiar with state legislation and the difficulties involved, and it presents clearly the various considerations, both economic and legal, bearing on the subject of rate regulation, in a straightforward manner which is worthy of the highest praise. Farrer's book is the result of many years experience at the head of the administrative department of the Board of Trade in England. While very little of it deals ostensibly with railroads, the experience connected with other lines of industry, and their regulation by law or commission, is scarcely less valuable to the railroad man than that which comes more familiarly under his own eye. Nor is English experience by any means without use to the American student of railroad management. English railroad rates in their narrower aspects are well treated by Grierson, "Railway Rates, English and Foreign."

For the continent of Europe, the most comprehensive work on rates and rate making is Ulrich, Eisenbahntarifwesen, Berlin and Leipzig, 1886.

This work has also been translated into French with important additions. It is an extremely useful compendium of practice on the continent of Europe, but the author's range of vision is badly limited by his lack of knowledge of English. He does not included English or American practice in his treatise. We have recently discussed his intelligent analysis of "Zone Tariffs." A book of some importance is Prof. Sax's "Die Eisenbahnen," Vienna, 1879. Perhaps the best French book is Colson's "Transports et Tarifs," which was noticed at some length in the *Railroad Gazette* for Sept. 4, 1891. Two French treatises by Duverdy, one on "The Transportation Contract" and the other on the "Application of Rates," published 20 years ago, had a very decided value.

What promises to be one of the most useful railroad works of reference is the German "Encyclopädie des gesamten Eisenbahnwesens," or General Railroad Encyclopedia, by Dr. Victor Röll, councilor to the General Management of the Austrian State Railroads, with the editorial assistance of chief engineers F. Kienesperger and Ch. Lang, and contributions from 122 persons, mostly railroad officers, professors of engineering, political economy, etc. Three royal octavo volumes have been published so far, covering the alphabet as far as "Fahrgeschwindigkeit."

The question of state ownership of railroads comes up for frequent discussion. It is incidentally treated in the books of Acworth, Adams and Hadley, already alluded to, as well as in a number of smaller English works, like Waring, "State Purchase of Railways." The argument for state ownership is perhaps most strongly presented in Prof. Wagner's "Finanzwesen," Berlin, 1876. The chapter which treats of railroads has been published separately. A masterly presentation of the question as affecting Germany was given in the argument presented in 1879 by the Prussian Government to the parliament with the bill which provided for the purchase of the corporation railroads. A translation of this argument was published in the *Railroad Gazette* of April 30, 1880, and three following numbers, and is still to be had in pamphlet form. Its presentation of the experience of Prussia in its attempts to regulate private railroads is especially interesting. The argument against state ownership was presented by Böhmert and many others in Germany, when it was a living question there, and also in the Report of the Italian Railroad Commission of 1881, and in a very brief manner in Alexander's "Railway Practice."

Mr. Albert A. Pope, of Boston, sends us an "Open Letter to the People of the United States," in which he appeals from the authorities of the World's Columbian Exposition, who have laid out, and will probably execute in the way they have proposed, a judicious scheme for the display of materials and machinery of road-making, in the several departments in which they properly belong; while Mr. Pope urges a "comprehensive road-exhibit in a suitable building, in which can be grouped all the things which would be useful in educating the people how to build good roads." We doubt whether this is one of the legitimate purposes of the World's Fair. How far is the mass of the population to be instructed there in the arts? Are all to be provided with an opportunity to become experts in all directions? Every family needs a clock, for instance, and other useful things; but it cannot be within the purposes of the Fair to instruct every rural swain how to produce such articles for himself. Doubtless there will be opportunities afforded to horologists to examine the methods of various manufacturers; but those persons skilled in the art, or curious, will cheerfully take some pains to learn where they can get the information which they desire. We agree with Mr. Pope that the subject of good roads is one of paramount importance to the people of this country, but there are and have been only two considerable obtacles which have prevented their universal construction in all the settled parts of the country; first, the general objection on the part of taxpayers to the cost of a good road, and, second, the mistaken idea that anybody and everybody can build one; and there is reason to fear

that the exhibition, even as designed by the managers, may nourish rather than dispel this illusion. If to group in one building the various articles which can be used in building a road, and sections of the best forms of constructing one, would conduce in any way to convert the taxpayer so that he would be ready to bear his part of the burden in building such roads, we should desire such an exhibit by all means; but if it only tends to convince him that, now he has seen these things, he is prepared to build roads himself, the effect may be the opposite of what could be desired.

The dissemination of information as to the money value of good roads to the taxpayers who need them, with facts as to the necessary cost of such, and the importance of having them well built in the first place, under the direction of trained experts, are the objects to be kept in view, as we conceive it, in any effort to be made by the Columbian exhibition for the furtherance of good road building. It has been and is now a common error to suppose that roads can be and should be built and maintained by the unaided efforts of the people of each district; accordingly, they have been abandoned to the control of the ignorant, with the natural result that we have, almost everywhere, as bad roads as the nature of the soil and the features of the country will admit of. This is an error which it will require much time and preaching to dispel; and more hard work will be needed in order to substitute for it the truths that the art of building roads is a science which has been perfected by the experiments and study of the best engineers for thousands of years, is well understood by experts, and is ever being improved; and that the more difficult the country in which a road is required the greater is the necessity for expert direction in its construction. In addition to this information it would be judicious to circulate also copies of the road laws which are thought to be the best for imitation, with suggestions of any desirable improvements in them, and information of any favorable results from their working which can be adduced. The great questions to be met are, What will it cost to build the road? When it is done, will it pay? Unless this can be satisfactorily proved the other showings will have been in vain.

The number of iron smelting furnaces in blast has been reduced by 20, and their weekly capacity on the first of this month was 188,109 tons, as against 193,827 tons on the first of March. We have to go back to November last to find so small a weekly capacity, but on account of March having 31 days the probable output for the month was 845,980 gross tons, or some 40,000 tons more than for February. This makes the probable production for the first quarter of the year slightly over 2,498,800 gross tons, or more than we produced for any whole year previous to 1879. Then No. 1 anthracite averaged $21.50. This year it has been between $16 and $17, and the fall of nearly 40 per cent. in price grieves the average blast furnace owner, and he is very anxious that some one else should "blow out," referring with more or less awe to a stock of 759,589 tons, which is less than five weeks' consumption. But no such profits or prices as those of the past are probable in the future. Our iron smelters are apparently resigned to making profits on a large output at a small price, instead of on a small output at a large price. And while the smaller stacks are in general being blown out (as is seen by the fact that those blown out average a weekly capacity of 286 tons, while those left in blast average 672 tons) the larger stacks are making great efforts to increase their output. This is being done in spite of the fact that the expected spring demand does not materialize. Though what may be termed ordinary consumption seems increasing in a healthy manner, no large enterprises are being inaugurated and railroads are buying rails very sparingly for renewals. The heavy drain on our floating capital from the return of our securities from Europe seems to be about stopped now, and as purchases are mentioned for European account, our money may again be seeking investments which will lead to a greatly increased consumption of iron. In England, besides the 97 furnaces damped down on account of the miners' strike, 11 have been blown out since Dec. 31 last, so that instead of 386 furnaces on the last of December, only 278 are now in operation. Business in the rest of Europe is not much better than in Great Britain, and we shall probably have to depend largely on our own resources for a business revival.

The Pennsylvania Railroad has created a lively stir in the stock market by announcing a reduction of tolls on anthracite coal to tidewater from $1.70 to $1.44 per ton, though this action is not to be taken as necessarily meaning a rate war but rather as the outcome in tariff figures of the changes in the situation brought about by the "Reading deal." It was essential to the success of the Reading's plans that the independent operators should be placated so that the total production of hard coal should conform as far as possible to the demand. In no other way could fair prices be maintained. To control this independent coal the Reading offered to carry it for these individual operators to tidewater at 40 per cent. of the tidewater price, assuming $4 as a fair estimate. This $4 limit has not yet been reached, so the Pennsylvania, to conform its actual tariffs to the mathematica of the other carriers and to protect its own shippers, has reduced the freight rate to 40 per cent. of $3.60 per ton, the present average. Doubtless the Pennsylvania will adjust this open rate to the conditions of the anthracite trade from time to time, and the basis on which it is made is certainly a rational one, but the men who predict serious demoralization of the coal trade, nevertheless, have considerable ground for feeling nervous. The Pennsylvania controls 8 or 10 per cent. of the anthracite shipments and the Reading officers say they will not notice this reduction, but a good deal less than eight per cent. will probably afford the power to seriously reduce the profits on the whole.

The rapid transit situation in New York is at present as follows: On Feb. 18 the Board of Rapid Transit Commissioners applied to the Supreme Court for the appointment of three Commissioners to determine in accordance with the Rapid Transit law whether the plans set forth in their report were in the interest of the public and ought to be carried out; the determination of such Commissioners to be taken, if favorable, in lieu of the consents of owners of property along the routes of the proposed railroad. A number of property owners objected to the appointment of this Commission on the ground that the plans as defined in the report were not sufficiently explicit either to enable owners of property to judge of the effect of the construction of the road, or to enable Commissioners to decide whether or not they were in the interest of the public. The decision of the General Term of the Supreme Court was handed down on April 7, and was to the effect that the general plans submitted by the Board complied sufficiently with the provisions of the law and enabled the property owners to determine in a general way the extent to which their property would be encroached upon. On April 15 the Court appointed three Commissioners—David McClure, a lawyer and a member of the Tammany Hall General Committee; Robert Maclay, the President of the Knickerbocker Ice Company, and Benjamin Perkins, for many years a banker in New York. The duty of this Commission, as prescribed in the Rapid Transit law, is to "determine after public hearing of all parties interested whether such railroads ought to be constructed and operated, and to report the evidence taken to the General Term of the Supreme Court, together with a report of their determination whether such railroad ought to be constructed and operated." They have given notice that the first public hearing for the taking of testimony will be held on April 27, at 11 a. m., at the office of the Rapid Transit Commissioners, No. 22 William street.

The railroads in the new spring wheat country do not fare alike, by any means, since the last bountiful harvest. Probably the Great Northern reflects better than any other one railroad the effects of the harvest in the Dakotas, but especially North Dakota. Its earnings last March were more than in March of last year. But the Northern Pacific, the eastern part of whose system is in the same country, gained only 5½ per cent. If then it shared to any extent the prosperity of the Great Northern in Dakota, it must have had losses on other parts of its system. The only definite indication we have of its business west of the mountains is contained in the report of the earnings of its competitor there, the Oregon Railway & Navigation Co., now worked by the Union Pacific, which reports it to have earned gross 32 per cent. less this year than last in January and February, while the Oregon Short Line, which competes for the through traffic, also shows a decrease. Then the Canadian Pacific, its nearest neighbor on the north, had but 4 per cent. more earnings in March this year than last. We are apt to forget, however, that by far the larger part of the mileage and a still greater proportion of the earnings of the Canadian Pacific are east of Lake Huron—that it is an Eastern railroad much more than a Western railroad. The Milwaukee & St. Paul, which is a neighbor of the Great Northern in the Dakotas, but whose chief mileage is farther east and south, reports a gain in March of 27¼ per cent. For the three months ending with March the Manitoba has gained 53 per cent., the Canadian Pacific 10 and the Milwaukee & St. Paul 25 per cent., while the Northern Pacific has *lost* 2¼ per cent.

The Master Mechanics' Association committee on compound locomotives will have an interesting report this year. Mr. George Gibbs, the chairman of the committee, has in charge a series of tests on the Chicago, Milwaukee & St. Paul, of two ten wheel locomotives, one simple and the other a Vauclain compound. The tests will be of two kinds: one an extended service test, and the other a more complete test with pyrometers, water meters, calorimeters, indicators, etc. In all of these tests a dynamometer car is used. This car is a new one with several improvements. It is modeled after the one used on the Chicago, Burlington & Quincy, but is different in several particulars. Among the new devices added is one for registering the strokes of the air, pump. An electric contact is made by the pump at the extreme end of the downward stroke. This actuates an escapement of a clock work in the dynamometer car, and the dial records the number of strokes. The plan of these experiments contemplates the most scientific and accurate test ever made of a compound locomotive, though the apparatus is, nevertheless, simple and easily handled by two men, except when the entire equipment of measuring apparatus is used, during the latter portion of the experiments. The water measurements are made by the Thomson water meter, the fuel is carried in bags, and, the amount of work performed being measured by the dynamometer, there should be no question as to the accuracy of the final data.

The Cleveland Car Service (demurrage) Association, which allows 96 hours' free time on coal, has revised its rules somewhat, changing the provisions of section *b* so that coal reconsigned to any other party in the same city or district shall not get the benefit of the four days' free limit twice. If the party first receiving the coal holds it more than 48 hours he will be held responsible for his share of the demurrage. When, however, a switching charge is made for the transfer to a second party the first consignee will have the 96 hours' free time but the second will have only 48 hours. These changes go into effect May 2. This association succeeded in releasing 88 per cent. of its cars inside of the free time limit in February, and 87 per cent. in March. The average detention by consignees in February was less than 24 hours per car. The average daily detention (total, on the usual basis, for the month of March was 1.53 days. On May 5 eight new stations will be added to the territory of the association.

The tests in progress on the Illinois Central to compare the Wootten-Vauclain compound suburban engine with the standard suburban engines of the road are about completed, so far as the Wootten engines are concerned. It now remains to test the simple engine, so as to compare the behavior of the two. These tests are being closely watched by Chicago railroad men, as the possibility that a Wootten firebox will save enough fuel to enable anthracite slack to be used, makes the financial question an important one with them. If they can see a way to abate the smoke nuisance in the city without adding materially to the cost for fuel, they will doubtless be quick to try it. The fact that the use of the compound will reduce the noise from the exhaust in starting trains is also important in a city.

How much some of the railroads west of Chicago have been affected by the construction of competing lines of late years may be judged by the statistics of of freight shipments eastward from Kansas City in 1891. Out of a total of 145,746 carloads, 49,652, or 34 per cent. went by the three new lines—the Atchison, Topeka & Santa Fe (which carried 21¼ per cent. of the whole and a third more than any other railroad), the Milwaukee & St. Paul, and the Chicago, St. Paul & Kansas City.

The 20 locomotives for the elevated road in Chicago were shipped this week from the Baldwin Locomotive Works in a single train hauled by the Master Mechanics' compound. This is probably the most unique train that ever crossed the country. The train will be photographed and copies of the picture will be given to the press.

TRADE CATALOGUES.

Kalamazoo Railroad Velocipede & Car Co., Kalamazoo, Mich.—This well known establishment has issued its "Catalogue No. 9," which is elegantly made, the illustrations being printed in brown and the pages embellished with a border of blue. Cuts are shown of each of the principal patterns of cars made by the company, and the parts are shown in detail, with price lists. The list of roads using this company's cars embraces nearly 200 names. The latest velocipede described is the "New Speeder, No. 1892," which weighs 140 lbs., and which can be handled, when off the track, by one man, like a wheelbarrow. The steam inspection car (locomotive) made by this company weighs only 1,000 lbs., a figure which suggests a decided contrast between this locomotive and some of those which we have recently described; as, for instance, the Erie 12-wheel compound, which weighs, with its tender, 283 times as much as the Kalamazoo machine.

TECHNICAL.

Pintsch Gas Lighting Apparatus.

The Safety Car Heating & Lighting Co., proprietors of the Pintsch compressed gas system, used for lighting passenger cars on the New York, Lake Erie & Western and many other roads, calls attention to the fact that the car which was burned up at New Portage, O., on March 30, is one of those which were equipped with gas apparatus several years ago (the Erie having been one of the first roads in this country to adopt that system), and that under the methods now employed in fitting up cars an explosion like that at New Portage is impossible. In that car the gauge was placed in the closet and the ignition, by the flame of an oil lamp, of gas escaping at that point was, it will be remembered, the cause of the explosion. The escaping gas came from the high pressure pipe. Under the plans now used the gauge is beneath the car, and none of the pipes inside of it contain high pressure gas. The pressure in these inside pipes is so very low that there is no danger of enough gas accumulating to cause an explosion.

The Electric Headlight.

The Philadelphia & Reading is trying one of the National Electric Headlight Co.'s electric headlights on one of its locomotives.

Tests of Rubber Hose.

The Cleveland Rubber Company publishes the results of some recent tests upon steam hose of various compounds and different plies of duck, subjected to constant steam pressure until bursting occurred in consequence of the degeneration of the hose. The results are stated indirectly in the form of recommendations to consumers, as follows: For 1½-in. hose, and larger sizes, intended for 25 lbs. steam pressure or less, there should be 5 plies of duck; with pressures from 25 lbs. to 60 lbs., use 6-ply hose, and above 60 lbs. pressure, add one ply for each additional ten pounds. For 90 lbs. pressure or more, the hose should, in addition, be duck covered and wire bound.

THE SCRAP HEAP.

Notes.

The Boston & Maine is to build a grain elevator of 1,500,000 bushels capacity on Mystic Wharf, Boston.

The Western New York & Pennsylvania is equipping its passenger cars with the Westinghouse air signal.

The express car of an Illinois Central train was robbed 80 miles north of New Orleans on the night of April 14.

A man convicted of an attempt at train wrecking was sentenced at Boise, Idaho, last week, to three years' imprisonment.

The Philadelphia & Reading has ordered the car shops at Wilkesbarre to be run on half time, and the forces have been reduced at other points.

The bill authorizing the New York Central to elevate its tracks between 106th and 135th streets in New York City was signed by Governor Flower this week.

The output of "whalebacks" at Superior City for the winter amounts to about 30,000 tons and to an aggregate length of 3,281 ft. It is proposed to load one of these boats with wheat for Russia as a Wisconsin contribution to the relief of the starving peasants of that country.

A through train was run by the Georgia Pacific from Birmingham, Ala., to Greenville, Miss., on April 14, for the first time in nearly two weeks, the road having been seriously damaged by floods. Even then the Mobile & Ohio tracks had to be used for a portion of the distance. The roadway was finally made passable on the 16th.

In the suit of the Chicago, Milwaukee & St. Paul against the Pullman Palace Car Co., alleging excessive charges made by the Pullman Company for operation, maintenance, etc, Judge Gresham has ordered the Pullman Company to produce all books, papers, vouchers, etc., that the Master may call for.

The Pennsylvania Co. has issued notices to telegraph operators that they must pass an examination on that part of the book of rules embracing the classification and rights of trains, flagging rules, special order rules and those pertaining to the duties and government of operators. Examinations will be commenced after July 31, 1892.—*Pittsburgh Post.*

Spanish American Notes.

The Buenos Ayres Great Southern Railway has received an ultimatum from the Railroad Board to provide new and more comfortable passenger cars.

It is stated that work is to be resumed this summer upon the Ecuadorian railroad into the interior, from Guayas to Quito, a distance of 246 kilometres, passing through the provinces of Leon, Chimborazo and Pichincha. It is expected to have the line completed by 1895.

The Argentine Great Central South American Railroad, projected from Reconquista, province of Santa Fé, to the Rio Pilcomayo opposite Asuncion, Paraguay, in the territory of Formosa, has asked for an extension of three years in which to finish the line. The company has about completed the first 45 kilometres of the road.

The Buenos Ayres Great Southern Railway has completed its harbor improvements at Bahia Blanca, having dredged a channel through the bar 230 ft. wide, with a depth sufficient to float vessels of 24 ft. draft at average high water. It has also just opened up a portion of its Ayacucho-Necochea extension, as far as Balcarce, 53 miles, and promises to have this entire branch, 121 miles in length, opened to traffic before September. It is also about to let a contract for another branch of 23 miles from Canuelas to Lobos.

The Central Transportation Co.

This concern, which is a sleeping car company whose control is apparently held by the Pullman Co., and whose property has long since been merged with that of the larger company, held its annual meeting in Philadelphia on Monday of this week. The principal business of the company for several years seems to have been the prosecution of suits in the courts against the Pullman Co. Resolutions were passed by the stockholders directing the incoming officers to prosecute vigorously the equity suit of the Pullman Palace Car Co., and if possible to require a deposit of the money which is now due the company, amounting to nearly $2,225,000. The new officers were also directed to inquire as to how the sum of $455,000, received by the Pullman Palace Car Co. for the property of the Central Co. destroyed by fire, is now represented.

Improved Train Service.

The Chicago & Northwestern has put in a new train between Chicago and Minneapolis. It leaves Chicago at 8:15 a. m., and arrives at Minneapolis at 10:30 p. m. In the opposite direction it leaves Minneapolis at 4:35 p. m., arriving in Chicago at 8:00 the next morning.

The Chicago, Burlington & Quincy will make important changes in its time table next week. A new express train will be put on, leaving Chicago at 10:30 p. m., via Omaha, for Denver, reaching there at 7 the second morning. It will have vestibuled sleeping and chair cars to Denver. Train No. 5 will run as now, except that it will have a sleeping car from Chicago to Deadwood, S. Dak. Train No. 1 will run as at present. The new eastbound train from Denver to Chicago, will leave Denver at 9 a. m., reaching Chicago 2 p. m. the following day.

The Rio Grande Western will put on a fast express on May 1. It will be limited to seven cars, and leaves Ogden at 7 a. m., reaching Grand Junction at 5:45 p. m., 10 hours and 45 minutes, or about 30 miles an hour, including stops. The westbound train will run from Grand Junction to Ogden in 11 hours.

The New Chicago Station of the Illinois Central.

Bradford L. Gilbert, of 50 Broadway, New York, has completed plans for the new Chicago passenger station of the Illinois Central at Lake Front Park, and the work on the building will begin immediately. The structure will have a frontage of 80 ft. on Park row and will include an office building facing the Lake Park. The building, including the trainsheds, will cost $900,000. The main ticket offices will be on the street level and the general waiting room will be 100 ft. wide and 150 ft. long. It is intended to erect the first three stories of the building on the Park row front of dark granite and to carry out the superstructure above, as well as the other facades, with buff speckled brick. The roofs will be covered with dark glazed Spanish tile. The tower will form a prominent feature of the building, not only as concerns its utility and adaptation as a clock tower, but also from the fact that the interior will be arranged for fireproof storage vaults. The trainshed, 600 ft. in length by about 136 ft. in widthwill be just south of the station.

LOCOMOTIVE BUILDING.

The Cleveland, Cincinnati, Chicago & St. Louis contract was given out this week. Fifty engines were ordered, and the Richmond Locomotive Works were awarded 30 engines, the Brooks Locomotive Works and the Schenectady Locomotive Works 10 locomotives each.

The Rogers Locomotive Works has an order from the Chicago, Burlington & Quincy for 50 simple-expansion locomotives. Of this number 25 are 10-wheelers, 25 moguls, class "H," with 60-in. boilers and standard Burlington dimensions, and with Westinghouse air pump and brake arrangement.

CAR BUILDING.

Six handsome passenger cars have just been completed at the West Detroit shops of the Michigan Central.

A contract has been awarded to the Ohio Falls Car Works at Jeffersonville, Ind., for building 50 Jenkins patent cars. The cars are for the use of the Live Poultry Transportation Co.

The shops of the Pennsylvania Co. in Fort Wayne, Ind., have commenced the building of 100 furniture cars for the Western system.

The Huntingdon & Broad Top road will in a few days award a contract for 250 hopper-gondola cars of 60,000 lbs. capacity, Pennsylvania Railroad standard.

The Chicago, Burlington & Quincy is in the market for 2,000 freight cars, including a large number of gondolas. The cars will have metal brake beams, rigid trucks, vertical plane couplers, Westinghouse air brakes and all modern improvements.

There has just been completed at the Montgomery shops of the Atlanta & West Point railroad what is said to be the most elegantly fitted train of its kind in the South. It is to be run in connection with the Washington & Southwestern vestibuled express, and consists of a mail, baggage and combination car, and first class and second class passenger cars. It is equipped with the Safety Car Heating & Lighting Co.'s appliances for heating with steam from the locomotive.

BRIDGE BUILDING.

Alameda, Cal.—The Alameda County Supervisors desire bids and plans for a bridge 100 ft. wide and 125 ft. long, over Temescal Creek, at Telegraph Avenue.

Albany, N. Y.—Senator Parker's bill providing for the removal of the present bridge and the erection of a new one to cost $12,000 over the Erie Canal at Water street, Albany, the city to pay the cost, has been passed by the New York legislature.

Belmont County, Ohio.—The Ohio Legislature has passed a bill authorizing the County Commissioners of Belmont County, Ohio, to issue $50,000 bonds to replenish the bridge fund, which was depleted two years ago, by repairs necessary on account of severe floods. There are several new bridges needed in the county and this money will be devoted to building as many of them as possible.

Bourne, Mass.—Sealed proposals will be received by the County Commissioners of Barnstable and Plymouth Counties, Mass., until May 7, for building a pile bridge, about 650 ft. long, over Cohasset Narrows, between Bourne and Wareham, Mass. All bids are to be made in accordance with specifications which may be obtained upon application to Edward S. Shaw, consulting Engineer, 146 Franklin street, Boston.

Buffalo, N. Y.—Bids will be received at the Department of Public Works until April 26 for constructing a wrought iron bridge over the Buffalo River on Bailey avenue.

Camden, N. J.—The Camden Board of Freeholders have been ordered to replace the present Federal street bridge over Cooper's Creek with a new structure with a 40 ft. draw. The cost will be about $30,000. The Board of Freeholders, some time ago, opened proposals for the erection of a new bridge at this point, but owing to a lack of funds the project was abandoned.

Cumberland, Md.—The Pennsylvania Steel Co., of Harrisburg, Pa., is building a new steel bridge for the George's Creek & Cumberland Railroad, to be thrown across Wills Creek in the place of the old bridge at the junction of Mechanic and Centre streets, Cumberland. It will be a double track, plate girder bridge, with two spans.

Duluth, Minn.—The Board of Army Engineers in their report to the Secretary of war oppose the proposed bridge at Duluth across the canal to Minnesota Point. The lift bridge is highly recommended, but the engineers say that in case any bridge is put in a swing bridge would be preferable to the lift bridge. They state that the tunnel scheme is the complete solution of the matter. The report will probably be accepted by the War Department as final, so far as the department is concerned, upon the bridge proposition. There is talk at Duluth of the city going ahead and building the bridge, claiming that the United States Government is without jurisdiction.

Elkins, W. Va.—The new steel bridge across the Tagart's Valley River at Davis avenue, Elkins, is progressing nicely. One of the piers is well under way and word has been received from the factory that the iron work will be completed on time. The bridge will be 160 ft. in length having three spans resting upon shore abutments and two piers. It is the intention to have the structure completed in July.

Flushing, O.—The Cleveland, Lorain & Wheeling Railroad will soon let contracts for a 15-span plate girder viaduct to replace a long trestle near Flushing. The new bridge will have 13 spans 32 ft. long and two spans 62 ft. long.

Gadsden, Ala.—The county commissioners have ordered a new bridge built across Little Canoe Creek, and also over Little Mills Creek.

Galveston, Tex.—The contract for the steel wagon bridge has been awarded by the County Commissioners to the Missouri Valley Bridge & Iron Works, of Leavenworth, Kan., for $175,000. The bridge will be built across West Galveston Bay from the mainland to Galveston Island. The draw span will be 180 ft. long and the trestle approaches will aggregate 2,340 ft.

Grafton, W. Va.—The Baltimore & Ohio has the material on the ground for a new bridge to connect the tracks of the Grafton & Greenbrier railroad with its main line at that point.

Hinton, W. Va.—Samuel B. Palmer & Co., of Stroudsburg, Va., bridge builders, have contracted to erect a new bridge over New River at Hinton, Summers County, W. Va.

Hokendauqua, Pa.—A new bridge, 300 ft. long, is to be built over the Lehigh River at Hokendauqua, by the County Commissioners.

Houston, Tex.—Bids for the erection of the bridge over Buffalo bayou on Milam street, Houston, and the removal of the old bridge over White Oak, were received from the Groton Bridge Co., $8,750 and the King Bridge Co., $8,576. The latter bid was accepted.

Knoxville, Tenn.—Sealed bids will be received by the Board of Public Works, of Knoxville, Tenn., April 29, for the construction of three iron highway bridges, about 2,200 ft. in all.

King County, Wash.—The contract for the construction of a bridge over the Snoqualmie River at McKinnon's Point was recently awarded by the Commissioners of King County to the San Francisco Bridge Co. The contract price is $6,500, and $2.50 per lineal foot additional for approaches. The span is 260 ft., 42 ft. above low water.

Kingston, Ont.—The town government is trying to secure the construction of an iron bridge by the Dominion Government to take the place of the wooden one spanning the Cataraque River.

Louisville, Ky.—Sealed proposals will be received until May 10 at the United States Engineers' office for the removal of the old bridge, at the new locks of the Louisville and Portland Canal, Louisville, and for replacing it by a new one of wrought iron or steel.

Mount Vernon, Wash.—The plans for a large bridge over the Skagit River to La Conner have been forwarded to the Secretary of War for his approval, the stream being navigable. The bridge is to cost $25,000, the county contributing $14,000 and Mount Vernon $11,000.

Newark.—The Passaic Rolling Mill Co., of Paterson, N. J., is replacing the wooden floor beams of the Passaic River bridges at Newark with iron members and also the overhead bridge at West End. It is reported that all the wooden bridges on the Morris & Essex Division are to be replaced with iron structures.

New York City.—Modified plans have been prepared by T. C. Clarke for the North River bridge, proposed by the New York & New Jersey Bridge Co. The original plans provided for a centre pier in the river, but this has been abandoned. The present design provides for a combined cantilever and suspension bridge. The river span will be 3,200 ft. The New Jersey end of the bridge will be at Miles avenue, the New York City end at a point between the lines of Seventieth and Seventy-first streets. A viaduct 100 ft. wide, with four main tracks and three lines of sidings, will run through private property to a point between Eleventh and Twelfth avenues, thence to a point above Thirty-eighth and Thirty-ninth streets. A large union station will be built on the blocks between Thirty seventh and Thirty-ninth streets, Eighth avenue and Broadway.

Parkersburg, W. Va.—The new steel bridge over the Kanawha River, at Parkersburg, W. Va., is about completed and will be open for traffic in a few days. The bridge cost $85,000 and connects the south side of the city with the main portion of the town.

Pittsburgh, Pa.—S. B. Schoyer, O. H. Boone, of Pittsburgh, and C. E. Sykes, of Bellevue, are organizing a company which proposes to build a bridge over the Ohio River from Wood's Run, Allegheny, to McKee's Rocks, at the foot of Wilkins street.

Portland, Me.—For a number of years the Grand Trunk has been considering the advisability of building a new railroad bridge in place of the old one from Portland to East Deering, and work was commenced last week. The new structure will be 1,550 ft. long, with stone abutments at each end, with a granite pier 32 ft. square in the centre for the draw. The draw will be of iron, and will be 180 ft., giving a span of 75 ft. clear, the old draw having but 40 ft.

Pueblo, Col.—The City Council has awarded the contract for building the Main street bridge to the Bullen Bridge Co. for the sum of $17,000.

Rochester, N. Y.—The Rochester Bridge Works will next week start constructing a 100-ft. span bridge for the Western New York & Pennsylvania road over Cashaqua Creek, and the Union Bridge Co. is to build another bridge over the same stream. When all danger of high water is over the company will replace the present bridge over the Genessee at Portageville with a new one of three spans.

A bill allowing Rochester to issue bonds for $150,000 to build bridges over the Genesee River passed the New York Legislature last week.

Rome, N. Y.—The New York Legislature has passed a bill providing for a new bridge over the Erie Canal at South Madison street in Rome.

Salisbury, N. B.—The Dominion Bridge Co., the lowest tenders, have obtained the contract for placing a new iron bridge across the Petitcodac River at Salisbury, New Brunswick. The work is to be completed by July 1.

Sunbury, Pa.—Capitalists of Sunbury are organizing a company to build a bridge across the Susquehanna River at that town, costing about $125,000.

Sutton, W. Va.—The County Court of Braxton County, W.Va., has condemned the suspension bridge at Sutton as unsafe and has appointed J. H. Hyer to receive estimates as to the cost of erecting a steel bridge to take its place.

Washington, Pa.—The County Commissioners of Washington County, Pa., have decided to erect a substantial bridge over Cat Fish creek, near Gatz's mill in that county. This bridge will take the place of a stone highway bridge now in use.

RAILROAD LAW—NOTES OF DECISIONS.

Carriage of Goods and Injuries to Property.

In the Federal Court it is held that a railroad cannot justify a charge of a greater compensation for a shorter than for a longer haul, under substantially similar conditions, contrary to the interstate commerce law, on the ground that the rate is fixed by a joint tariff agreement with other roads. Nor because the result comes about by reason of the selection of different points on the line as a basis for computing rates, so as to charge one rate over one part of the road and a different rate over another part.[1]

In Mississippi the Supreme Court holds that where a railroad company under a special contract furnishes an entire car, in which stock may be fed and watered, to a shipper who loads it with "emigrant movables" and several horses, the contract requiring that he load the car and accompany it, and feed, water and care for the stock at his own risk and expense and exempting the company from liability for delays, and there is no agreement as to any lay out along the route, the shipper does not, in the absence of a custom to that effect, acquire by such contract the right to have the car stopped and laid out, so that he may rest his horses and thus save them from suffering and death, but can only secure such delay by abandoning the contract, or by contracting anew for the use of the car for a longer time.[2]

In Texas the railroad charged $1.70 a hundred on freight from San Francisco to El Paso, and $2 on freight to the City of Mexico; its line connecting at El Paso, which was about half way, with the Mexican Central; on through freights its division with the Mexican Central gave it only 96 cents for carrying to El Paso. Plaintiff shipped goods from San Francisco to the City of Mexico, his receipt therefor providing that, if shippers, consignees, or their agents should remove their goods from the warehouse at El Paso, the shipment would be treated as an El Paso proper shipment, and full El Paso proper rates collected. Held, that plaintiff could not demand and receive the goods at El Paso without paying the full local rates to that point.[3]

In New York a coal of fire fell from the engine of an elevated railroad, and set fire to plaintiff's awning. The company's engines were kept equipped with the best appliances to prevent the escape of fire, but there was no evidence as to the actual condition of the engine in question; and it was shown that so large a coal could not have escaped had the engine been in proper condition, and that there were openings in its ash pan, from which coals might have fallen. The Court rules that the evidence sustained a finding that the fire was due to the company's negligence.[4]

In Texas it is held by the Supreme Court that dogs are not "stock," within the meaning the law (art. 4245) and railroads are not required to fence against them. In this case the train stopped at a side track to unload freight, and plaintiff's dog went under it. The conductor, having knowledge of such fact, after the freight was unloaded, signaled the engineer to start, and the dog was run over. The court holds that a verdict for plaintiff was not sustained.[5]

In West Virginia, in the absence of special legislation requiring a railroad to fence its track, there is no general law which requires them to do so, nor is there any general law against the owners of stock allowing it to run at large or to pasture on public roads; so that the bare fact that a railroad is unprotected by cattle-stops where it crosses a public road does not render the railroad company liable to pay for such stock straying upon the track and killed by a train; nor can contributory negligence be attributed to the owner for allowing his stock to run at large.[6]

In New York the Court of Appeals decides that when a railroad erects an abutment of stone and an earth embankment about 14 ft. high on a street in front of plaintiff's premises, and thereon operates its road, leaving but a narrow space between it and the plaintiff's premises, insufficient to admit of the approach of a team and vehicle, and plaintiff has no other access to his property, plaintiff has a right of action for damages, even though defendant is acting in pursuance of an act of the legislature, and the city commissioners have discontinued that portion of the street under the authority of said act.[7]

Injuries to Passengers, Employes and Strangers.

In Indiana a railroad advertised an excursion train on a certain day to a certain place, giving the time of its arrival and departure at the various stations, and the fare for the round trip; plaintiff went to one of the small stations, and sought to procure a round trip excursion ticket, but there were no such tickets for sale at that station; plaintiff paid more than the fare for the round trip at the excursion rate to the conductor, and took his receipt and demanded that he be carried the round trip; returning on the same train the same conductor demanded a return fare, and, on his refusal to pay, ejected plaintiff from the train. The Appellate Court holds (1) that the plaintiff was entitled to the excursion rate; (2) that it was not incumbent on plaintiff to pay the return fare demanded, and then sue to recover the same since such a course would be purchasing a right he already had; (3) that it was no defense that the ticket office had been discontinued at this station, as plaintiff had a right to expect defendant to furnish reasonable facilities for obtaining tickets.[8]

In Alabama it is laid down that a rule of a railroad company forbidding employés from going between cars in motion to uncouple them is reasonabe and "wholesome."[9]

In Oregon, the Supreme Court holds that where a laborer is employed by a railroad in removing obstructions and repairing its track, known by the laborer to be in a dilapidated condition, by reason of unusual storms causing slides and washouts, he assumes the risks incident to such employment, and, though he loses his life, the company is not liable, unless such risks are enhanced by some neglect of the company.[10]

In New York an engineer, suddenly placed in a position of apparent imminent danger from collision of his engine with another, wrongfully upon the track, jumped from his cab, and sustained serious injuries. The Supreme Court rules that, although no collision occurred, his act was not the result of such unreasonable alarm as would preclude a recovery for the injuries received.[11]

In Texas it is laid down by the Supreme Court that in an action for the death of an employe who was killed while attempting to uncouple moving cars, where the evidence showed that the track was in bad condition, and that the person whom the company employed to keep the track in order was incompetent and that the decedent was engaged in the usual aud necessary work of uncoupling cars, which he might have performed without injury but for the defects in the track, which were likely to cause him to stumble and fall, judgment should not be reversed on the ground that there is no proof of negligence on the part of the railroad company.[12]

In California the deceased, with the knowledge and consent of the company, was walking to his work on the right of way in a narrow place between a bluff and the sea, traversed by two parallel tracks, with knowledge that two locomotives, one on each track, would shortly follow him in the same direction; that he received warning by the bell of one, and then perceived that they were approaching at such relative rates of speed as would probably bring them together at the moment of passing him; that he attempted to cross the track toward the bluff, and was struck and killed while so doing. The Supreme Court reverses a judgment in favor of the railroad.[13]

In Indiana, a child, 20 months old, escaped from its home, went upon a railroad track, and was killed by a train. The engineer testified that when about 600 ft. distant he saw the child in the weeds bordering the track, and immediately shut off steam, reversed the engine and sanded the track, but that the child crawled on the rail before he reached it. The train was running about 40 miles an hour, and could not have been stopped in less than 1,200 ft. The direct distance from the weeds to the track was 7 ft., but there was an intervening ditch 2 ft. deep. Further back was a bridge across the ditch, but the evidence failed to show which route the child took. The child could walk, but was slow in its movements, and habitually crawled over obstacles. Two witnesses familiar with its movements testified that it would have required between two and three minutes to crawl from the weeds to the track. There was evidence that while so doing it might have been seen at a distance of 700 yards. The Appellate Court holds that the railroad is not liable.[14]

In New York an employé was killed while engaged in working upon a track, used jointly by his employer and defendant, by a car set in motion by one of defendant's trains, without a brakeman thereon in a position to enable him to perceive danger, as required by its rules. The company employing deceased had a similar rule. The Supreme Court holds that deceased had a right to rely on the observance of the rules, and therefore his omission to pay attention to the movements of approaching trains was not, as a matter of law, contributory negligence.[15]

[1] Osborne v. Chicago & N. W. Ry. Co., 48 Fed. Rep., 49.
[2] Ill. Cent. R. Co. v. Peterson, 10 So. Rep., 43.
[3] Southern Pac. Ry. Co. v. Haas, 17 S. W. Rep., 600.
[4] Sugarman v. Manhattan El. R. Co., 16 N. Y. S., 533.
[5] Texas & P. R. Co. v. Scott, 17 S. W. Rep., 1116.
[6] Layne v. Ohio River R. Co., 14 S. E. Rep., 123.
[7] Ezerer v. N. Y. C. & H. R. R. Co., 29 N. E. Rep., 95.
[8] Chicago, St. L. & P. R. Co. v. Graham 29, N. E. Rep., 170.
[9] Memphis & C. R. Co. vs. Graham, 10 South. Rep., 283.
[10] Carlson v. O. S. L. & U. N. Ry. Co., 28 Pac. Rep., 497.
[11] Gross v. P., P. & B. R. Co., 16 N. Y. S., 616.
[12] Texas & P. Ry. Co. v. Robertson, 17 S. W. Rep., 1041.
[13] Noyes v. S. R. R. Co., 28 Pac. Rep., 288.
[14] Penn. Co. v. Davis, 29 N. E. Rep., 435.
[15] Noonan v. N. Y. C. & H. R. R. Co. (Sup.), 16 N. Y. S., 678.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Lake Erie & Western, quarterly, 1¼ per cent. on the preferred stock, payable May 16.

Nashville, Chattanooga & St. Louis, quarterly, 1¼ per cent. on the capital stock, payable May 2.

Wheeling & Lake Erie, quarterly, 1¼ per cent. on the preferred stock, payable May 16.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Allegheney Valley, annual, Philadelphia, Pa., May 2.
Canadian Pacific, annual, Montreal, P. Q., May 11.
Central of New Jersey, Annual, Jersey City, N. J., May 6.
Chicago, Burlington & Quincy, annual, Chicago, Ill., May 18.
Cincinnati, Hamilton & Dayton, special, Cincinnati, O., May 9.
Delaware & Hudson Canal Co., annual, New York, May 10.
Eastern of New Hampshire, annual, Portsmouth, N. H., May 3.
Elmira & Lake Ontario, annual, New York, N. Y., May 5.
Lake Shore & Michigan Southern, annual, Cleveland, O., May 4.
Little Rock & Fort Smith, annual, Little Rock, Ark., April 28.
Michigan Central, annual, Detroit, Mich., May 5.
Missouri, Kansas & Texas, annual, Parsons, Kan., May 18.
New York, Chicago & St. Louis, annual, New York, N. Y., May 4.
New York & Harlem, annual, New York City, N. Y., May 17.
Norfolk & Western, annual, Roanoke, Va., May 4.
Omaha & St. Louis, annual, Stanberry, Mo., May 17.
Panhandle of Texas, annual, Washburn, Tex., May 3.
Pittsburgh, Virginia & Charleston, annual, Philadelphia, Pa., May 3.
Pittsburgh & Western, annual, Allegheney City, Pa., May 2.
St. Louis, Alton & Terre Haute, annual, St. Louis, Mo., June 6.
St. Louis, Iron Mountain & Southern, special, St. Louis, Mo., May 27.
St. Louis Southwestern, annual, St. Louis, Mo., May 4.
St. Louis Southwestern of Texas, annual, Tyler, Tex., May 2.
Traverse City, annual, Travers City, Mich., May 5.
Union Pacific, annual, Boston, Mass., April 27.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *National Association of Car Service Managers* will hold its next annual meeting at Philadelphia, Pa., April 27.

The *Association of Railway Accounting Officers* will hold its fourth annual meeting at the Auditorium Hotel, Chicago, Ill., May 25.

The *American Institute of Electrical Engineers* will hold its next annual meeting at the Grand Pacific Hotel, Chicago, Ill., June 6.

The *American Society of Civil Engineers* will hold its next annual convention at the Hygeia Hotel, Old Point Comfort, Va., June 8.

The *Master Car Builders' Association* will hold its annual convention at Congress Hall, Saratoga Springs, N. Y., June 15.

The *American Railway Master Mechanics' Association* will hold its annual convention at Congress Hall, Saratoga Springs, June 20.

The *American Association of General Baggage Agents* will hold its next annual meeting at Mackinac Island, Mich., July 20.

The *New England Railroad Club* holds regular meetings, at the United States Hotel, Beach street, Boston, Mass., on the second Monday of each alternate month, commencing January.

The *Western Railway Club* holds regular meetings on the third Tuesday in each month, except June, July and August, at the rooms of the Central Traffic Association in the Rookery Building, Chicago, at 2 p. m.

The *New York Railroad Club* holds regular meetings on the third Thursday in each month, at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, N. Y.

The *Southern Railway Club* holds regular meetings on the third Thursday of the months of January, February, March, May, September and November at such points as are selected at each meeting.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, the fourth Wednesday of January, March, May, September and November. By special resolution the next meeting will be held in April.

The *Northwest Railroad Club* meets on the first Saturday of each month, except June, July and August, in the St. Paul Union Station, at 7:30 p. m.

The *Northwestern Track and Bridge Association* meets on the Friday following the second Wednesday of March, June, September and December, at 2:30 p. m. in the directors' room of the St. Paul Union Station.

The *American Society of Civil Engineers* holds its regular meetings on the first and third Wednesday in each month, at the House of the Society, 127 East Twenty-third street, New York.

The *Boston Society of Civil Engineers* holds its regular meetings at the American House, Boston, at 7:30 p. m., on the third Wednesday in each month.

The *Western Society of Engineers* holds its regular meetings at 78 La Salle street, Chicago, at 8 p. m., on the first Wednesday in each month.

The *Engineers' Club of St. Louis* holds regular meetings in the club's room, Laclede Building, corner Fourth and Olive streets, St. Louis, on the first and third Wednesday in each month.

The *Engineers' Club of Philadelphia* holds regular meetings at the House of the Club, 1,122 Girard street, Philadelphia, on the first and third Saturday of each month. The annual meeting is held on the third Saturday in January. The club stands adjourned during the months of July, August and September.

The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Thaw Mansion, Fifth street, Pittsburgh, Pa.

The *Engineers' Club of Cincinnati* holds its regular meetings at 8 p. m. on the third Thursday of each month in the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati.

The *Civil Engineers' Club of Cleveland* holds regular meetings on the second Tuesday of each month, at 8 p. m., in the Case Library Building, Cleveland. Semi-monthly meetings are held on the fourth Tuesday of the month.

The *Engineers' Club of Kansas City* meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.

The *Engineering Association of the South* holds its monthly meetings on the second Thursday at 8 p. m. The Association headquarters are at Nos. 63 and 64 Baxter Court, Nashville, Tenn.

The *Denver Society of Civil Engineers and Architects* holds regular meetings at 36 Jacobson Block, Denver, Col., on the second and fourth Tuesday of each month, at 8 o'clock p. m., except during June, July and August, when they are held on the second Tuesday only.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.

The *Civil Engineers' Association of Kansas* holds regular meetings at Wichita on the second Wednesday of each month at 7:30 p. m.

The *American Society of Swedish Engineers* holds meetings at the club house, 250 Union street, Brooklyn, N. Y., and at 347 North Ninth street, Philadelphia, on the first Saturday of each month.

The *Engineers' Club of Minneapolis* meets the first Thursday of each month in the Public Library Building, Minneapolis, Minn.

The *Canadian Society of Civil Engineers* holds regular meetings at its rooms, 112 Mansfield street, Montreal, P. Que., every alternate Thursday except during the months of June, July, August and September.

The *Association of Civil Engineers of Dallas* meets at 803 Commerce street, Dallas, Tex., on the first Friday of each month at 4 o'clock p. m.

The *Technical Society of the Pacific Coast* holds regular meetings at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., at 8 o'clock p. m. on the first Friday of each month.

The *Tacoma Society of Civil Engineers and Architects* holds regular meetings on the third Friday of each month, in its rooms, 201 and 202 Washington Building, Tacoma, Wash.

The *Engineers and Architects' Club of Louisville* holds regular meetings on the second Thursday of each month, at 8 o'clock p. m., at its rooms in the Norton Building, Louisville, Ky.

The *Association of Engineers of Virginia* holds regular meetings at Roanoke, on the second Saturday in each month, at 8 p. m., except the months of July and August.

American Institute of Mining Engineers.

The next meeting will be held in the Lake Champlain region, commencing at Plattsburgh, N. Y., June 21. Arrangements are in progress for visits to mines and furnaces, and a trip into the Adirondacks.

An International Engineering Headquarters will be maintained in Chicago during the World's Columbian Exposition of 1893. The estimated expense will be $15,000, which must be met by contributions from Amer-

ican engineers. The committee in charge comprises two representatives of the Institute, and many of the members. The Council has also undertaken, at the request of the General Committee of Engineering Societies, to organize and conduct the Mining and Metallurgical Departments of the World's Engineering Congress of 1893 in Chicago. The Council, therefore, now appeals to members and associates for liberal subscriptions to a special Columbian Exposition fund.

American Society of Civil Engineers.

The American Society of Civil Engineers will hold its annual convention at the Hygiea Hotel, Fortress Monroe, Va., beginning on Wednesday, June 8, as has already been announced. Members intending to send papers should give early notice to the Secretary of such intention. It is expected that reports will be presented by the special committees on Uniform Methods of Testing Materials used in Metallic Structures; on Standard Rail Sections; on Impurities of Domestic Water Supply, and on Units of Measurement.

The Board of Direction, at the meeting held April 5, appointed to the office of Assistant Secretary of the society, Mr. Charles Warren Hunt, M. Am. Soc. C. E., of New Rochelle, N. Y.

Central Railway Club.

A special meeting of this club will be held at the Hotel Iroquois, Buffalo, N. Y., Wednesday, April 27, at 9:30 A. M., to consider amendments to the "Rules of Interchange" to be recommended to the Arbitration Committee of the M. C. B. Association. As this will be the last meeting of the club prior to the Master Car Builders convention in June, and the subject is a most important one, a large attendance is desired.

In consequence of this special meeting, the regular May meeting will be dispensed with.

The Canadian Society of Civil Engineers.

At the meeting of the society called for Friday, April 22, at the society's rooms, 112 Mansfield street, Montreal, a paper by Mr. Alan MacDougall, a member of the society, on "The Professional Status, a Plea for a Close Corporation," is announced.

The Civil Engineers' Club of Cleveland.

The April meeting of the club was held April 12. Ernest C. Barth and Peter Rasch were elected active members. A paper was read by Dr. Dayton C. Miller, of Case School of Applied Science on "Astronomical Spectroscopy."

The Denver Society of Civil Engineers.

A meeting of the Denver Society of Civil Engineers and Architects was held at the Jacobson block, Denver, April 12. Colonel A. A. Blow, who has charge of the Colorado mining exhibit at the World's Fair, explained the plans which are now being made. The society will aid in the preparation of a topographical map on a scale of two miles to an inch, making the map about 18 ft. square. There will also be constructed for exhibition at Chicago a relief model on the same scale horizontally but exaggerated vertically, about two and one-half to one.

The Engineers' Club of Philadelphia.

At the regular meeting on April 2, President James Christie in the chair, 38 members were present. The following were elected to active membership: Henrik V. Losse, F. V. Hetzel, Clayton W. Pike, H. M. Montgomery, C. O. C. Billberg, Charles W. Close.

Mr. W. S. Auchincloss read a paper on Yearly Tides. In this paper the author stated that he proposed to show that confined bodies of fresh water are subject to yearly tides of greater or less magnitude, depending upon the nature of the basin or upon the strata to which they are confined, and upon the effect of evaporation if in an open basin.

Mr. Jacques W. Redway presented a paper on The Influence of Rainfall on Commercial Development—A Study of the Arid Region. East of the Mississippi River the author said the rainfall is always over 30 in. a year, the average being nearer 40, but beyond the Missouri the rainfall lessens considerably, and, except on the northern part of the Pacific Slope, no portion of this area receives more than 30 in. of rain, the average being less than 15. The author divided this area into three regions—the Plains, the Colorado Plateau and the Great Basin. The arid lands of the United States cover upward of 900,000,000 acres; in other words, one third of the territory of the United States consists of land that cannot yield food crops without artificial aid. The author then took up the methods of irrigation, and stated that the only feasible method is that of storage basins.

PERSONAL.

—Mr. George B. Cornell has been appointed Chief Engineer of the East River Bridge Co., which is to build the bridges across the East River between New York and Brooklyn for the Brooklyn Union Elevated Road.

—Mr. George F. Gardner, Superintendent of the Zanesville & Ohio River road, has tendered his resignation, to take effect May 1, at which time he will become General Superintendent of the Cincinnati, Lebanon & Northern road, with headquarters at Cincinnati.

—Mr. F. J. Griffith is now Acting Superintendent of the Morris & Essex Division of the Delaware, Lackawanna & Western. Mr. Andrew Reasoner has been confined to his home for the past two months and will not be able to resume his duties for some time to come.

—Mr. W. J. McKee, who has been Master of Trains on the Central of Georgia at Savannah, has been appointed Superintendent of the Louisville, New Orleans & Texas road. He was formerly Division Superintendent on the Richmond & Danville and also on the Cleveland, Cincinnati, Chicago & St. Louis.

—Mr. Richard S. Hayes, President of the St. Paul & Duluth and the New York & Northern, is spoken of in connection with the Presidency of the Union Pacific. He seems to be the candidate of the European interests. Captain Hayes admits that he has had negotiations with the foreign representatives.

—General E. P. Alexander resigned this week the Presidency of the Port Royal & Western and the Port Royal & Augusta railroads, and the steamship lines controlled by the Central of Georgia. It is expected that President Comer, of the Central of Georgia, will succeed him in all these offices.

—Mr. A. E. Mitchell, who has been Mechanical Engineer of the New York, Lake Erie & Western, has been appointed Superintendent of Motive Power of the road and its leased lines, with headquarters at New York City, vice Mr. Ross Kells, deceased. Mr. S. Higgins has been appointed Assistant Superintendent of Motive Power, vice Mr. W. F. Turreff, deceased.

—Major Cecil Gabbett, who was General Manager of the Central of Georgia before its lease to the Richmond Terminal System, was appointed General Manager of the Columbus Southern this week. Mr. Gabbett was formerly General Manager of the Western of Alabama and Atlanta & West Point roads, and was for a time President of the former company.

—Governor Brown, of Kentucky, has nominated a new State Railroad Commission, the new Commissioners being Messrs. Ray Woodson, of Owensboro, a newspaper editor; C. C. McChord, of Springfield, an attorney, and Charles B. Poyntz, of Maysville, who is at present a member of the State Senate. The outgoing Commissioners are I. A. Spalding, W. B. Fleming and George M. Adams.

—Mr. Eugene Canfield, the projector of the Fairhaven & Southern, and the President as well as builder of the Bellingham Bay & British Columbia road, died at New Whatcom, Wash., on April 6. Mr. Canfield was formerly a prominent lawyer of Chicago, but became interested in the development of Washington soon after the completion of the Northern Pacific, and removed to Seattle 10 years ago.

—Mr. Matthew G. Elliott, of New Haven, Conn., died at his home in that city April 17. He was a member of the first board of directors of the New Haven & Northampton Railroad, holding that office for many years. He was elected President of the New Haven & New London Railroad in 1852, resigning that office in 1855 to become President of one of the New Haven banks.

ELECTIONS AND APPOINTMENTS.

Adirondack & St. Lawrence.—James Macbeth, Superintendent of Motive Power and Rolling Stock, has been made Acting Superintendent of the road in addition to his other duties.

Baltimore & Ohio.—L. J. Buckley, Acting Purchasing Agent, has been appointed Purchasing Agent. The office of General Storekeeper has been abolished, and that of Superintendent of Stores substituted in lieu thereof. George Tozzer has been appointed Superintendent of Stores, to take effect April 20.

Bentonville & Sulphur Springs.—The incorporators are R. B. Schneider and Ray Nye, of Fremont, Neb.; James M. Bohart, James C. Knott, W. A. Terry, A. J. Bates, of Bentonville, Ark.; Charles H. Hibler, of Sulphur Springs, Ark., and Virgil R. Porter, of Plattsburg, Mo.

Cedar Falls & Minnesota.—At the meeting of stockholders of the Company held at Dubuque, Ia., last week the following directors were elected: J. Kennedy Tod, W. Stuart Tod, John Kean, Jr.; Julian L. Meyers, and Peter Forester. At a subsequent meeting J. Kennedy Tod, of New York, was elected President.

Chicago & Erie.—A. E. Mitchell has been appointed Superintendent of Motive Power, with headquarters at No. 21 Cortlandt Street, New York, vice Ross Kells, deceased.

The road will hereafter be operated as two divisions. The Eastern Division will include the territory from Marion Junction to Huntington, Ind., C. C. Reynolds, Superintendent, with office at Huntington, Ind. The Western division will include the territory west of Huntington yard; G. A. Coe, superintendent, with office at Chicago. A. M. Mozier has been appointed Superintendent of Transportation, with office at Cleveland, O.

Chicago & Northern Pacific.—Edward Shearson has been appointed Auditor of the Chicago & Northern Pacific Railroad and Chicago & Calumet Terminal Railway companies, and as such will have immediate charge of the operating accounts, with office in Grand Central Passenger Station, Chicago, Ill.

Chicago, Rock Island & Pacific.—C. H. Hellbub, Superintendent of the Southwestern Division, has been transferred to Colorado Springs. Col. S. B. Hovey has been named as his successor, with headquarters at Hetherington, Kan.

Choctaw Coal & Railway Co.—F. L. Moeller, heretofore car accountant, has been appointed Superintendent of Transportation and Car Service; headquarters South McAlester, I. T. J. F. Holden has been appointed Auditor and Traffic Manager, with headquarters at South McAlester, I. T. He has heretofore been Auditor.

Cincinnati, Saginaw & Mackinaw.—The annual meeting of the stockholders was held in Saginaw, Mich., April 20, at which officers and Directors were elected as follows: President, A. W. Wright; Secretary and Treasurer, J. H. Muir, Detroit; Directors, W. R. Burt, F. C. Stone, Saginaw; E. W. Medraugh, Detroit; W. J. Spicer, Chicago; S. O. Fisher, West Bay City.

Cincinnati, Wabash & Michigan.—The following Board of Directors has been elected by the stockholders: J. Pierpont Morgan, George Bliss, Chauncey M. Depew, Cornelius Vanderbilt, H. McK. Twombly, J. D. Layng, W. P. Anderson, M. E. Ingalls, James Barnett, Amos Townsend, Benjamin S. Brown.

Columbus Southern.—Cecil Gabbet has accepted the position of General Manager of this road, with headquarters at Columbus, Ga. He succeeds Major W. F. Shellman, who has been appointed General Traffic Manager of the Central, of Georgia.

Davenport, Iowa & Dakota.—The annual meeting was held at Davenport, Ia., April 14, and resulted in the choice as directors of C. J. Ives, C. D. Ives, W. W. Douglas, T. H. Simmons and Robert Williams, of Cedar Rapids, and W. C. Wadsworth, J. R. Lane and M. L. Marks, of Davenport. W. C. Wadsworth was elected President; S. S. Dorwart, Cedar Rapids, Treasurer, and W. P. Brady, Cedar Rapids, Secretary. The road is operated by the Burlington, Cedar Rapids & Northern.

Davenport, Middleburg & Durham.—The first Board of Directors is as follows: Edwin M. Harris, of Cooperstown, N. Y.; William E. Thorne, J. Edward Young, John H. Cornell, Jerome B. Badgley and Jacob Neville, of Middleburg, N. Y.; Benjamin H. Avery, of Jefferson; Charles W. Vroman, of Fulton; Nehemiah C. Whitcomb, of Durham; Elias W. Dutton, of Broome; Melvin C. Wright, of Blenheim; John Avery, of Catskill and Henry Russell, of Albany.

Fort Worth & Rio Grande.—The following Board of Directors has been elected: H. B. Hollins, C. M. Wicker and John S. Ellis, of New York; J. P. Smith, B. B. Paddock, K. M. Van Zandt, E. W. Taylor and John Hornby, of Fort Worth, and Brook Smith, of Brownwood, Tex. The directors elected the following officers: John Hornby, President; C. M. Wicker, Vice-President; J. Van Rensselaer, Treasurer, and Richard Lord, Secretary.

Great Northern.—P. P. Shelby, General Traffic Manager, has been appointed General Manager of the Pacific Coast Line of this company.

George B. Jaynes has been appointed Resident Engineer between Lowell and Sultan, Wash.

Illinois Central.—H. McCourt has been appointed Superintendent of the Amboy Division vice J. C. Jacobs, resigned.

Missouri Southeastern.—The officers of the company are: George H. Crumb, Poplar Bluffs, Mo., President and General Manager; W. S. Randall, Poplar Bluffs, Vice-President; M. S. Phelan, Secretary; James E. Boyd, Bloomfield, Mo., Treasurer, and C. W. McCrae, Cape Girardeau, Mo., Chief Engineer. The headquarters of the company is at Bloomfield, Mo.

New York Central & Hudson River.—The annual meeting of the company was held at Albany, N. Y., April 20. The following were elected Directors: Cornelius Vanderbilt, Chauncey M. Depew, Charles C. Clark, Horace J. Hayden, William K. Vanderbilt, Frederick W. Vanderbilt, Samuel F. Barger, J. Pierpont Morgan, Cyrus W. Field, of New York; William Bliss, Boston; Sherman S. Jewett, Buffalo; Erastus Corning, Albany; George C. Buell, Rochester.

New York, Lake Erie & Western.—A. E. Mitchell mechanical engineer, was appointed Superintendent o Motive Power, April 18, vice Ross Kells, deceased. His headquarters will be at 21 Cortlandt street, New York city.

S. Higgins has been appointed Assistant Superintendent of Motive Power, and placed in charge of the Department of Lines west of Salamanca, with office at Cleveland, O., vice W. F. Turreff, deceased.

Ohio Southern.—At the annual meeting of the stockholders in Cincinnati, April 19, the following Directors were elected: C. W. Fairbanks, Rush C. Hawkins, J. L. Humfreville, H. L. Chapman, George W. Saul, S. Beymer, F. A. Barnaby, H. B. Moorehead, George H. Frey, John Carlisle, Judson Harmon, Joseph L. McGruc. The first four are the only ones re-elected. Messrs. Maxwell, Graves and Sully declined re-election. George W. Saul was chosen president of the company in place of Alfred Sully.

Philadelphia & Northern.—The incorporators of the company are as follows: E. Lawrence Fell, Philadelphia, President; David S. Grafly, Charles C. Midwood, John Strong, Jr.; and Robert L. Russell, Philadelphia; William B. Eltonhead, West Point, and Edward D. Cook, Germantown, Philadelphia.

Philadelphia & Reading.—George F. Randolph has been appointed First Assistant General Freight Agent, with office at No. 227 South Fourth street, Philadelphia, Pa. L. W. Frost has been appointed New England Freight Agent, with office No. 211 Washington street, Boston, Mass. Mr. T. B. Koons has been appointed Division Freight Agent, with office at No. 113 West Fourth street, Williamsport, Pa.

Portland & Astoria.—The directors have elected the following officers: President, John C. Sheehan, of New York; Vice-President, C. W. Scofield, of Utah; Secretary and Treasurer, J. F. Watson, of Portland; Superintendent of Construction and Manager, George Goss, of Salt Lake City, Chief Engineer of the Rio Grande & Western.

Rockport & Harbor Island.—The incorporators of the company chartered in Texas last week are: George Gurley, F. H. Mathis, M. Sternberger, M. J. Hathaway, of Rockport, Tex., and J. H. Traynor, W. G. Keller, E. A. Stevens, H. Hamilton, W. A. Kemp and H. C. Hoskins, of Dallas, Tex.

San Jose & San Francisco Transportation Co.—The following are the incorporators of this new California road; William R. A. Johnston, of San Francisco, formerly of the Pacific Mail; Joseph H. Rucker, M. Phillips, V. Koch and James Deitrick, of San Jose, Cal.

Santa Fe & Santa Monica.—The incorporators are: A. Manvel, Chicago; F. T. Perris, San Bernardino, Cal.; K. H. Wade, L. Mesmer, F. B. Henderson, F. H. Pattee and G. Holterhoff, all of Los Angeles, Cal.

Seattle, Lake Shore & Eastern.—A circular has been issued announcing that hereafter this road will be operated under the general officers of the Northern Pacific. I. A. Nadeau has been appointed Superintendent of the Western Division, with headquarters at Seattle, and F. W. Gilbert has been appointed Superintendent of the Spokane Division, with headquarters at Spokane, Wash. Mr. Nadeau has been Assistant Superintendent of the road and Mr. Gilbert is Superintendent of the Idaho Division of the Northern Pacific.

Southern Pacific.—A. D. Kilborn has been appointed Master Mechanic of the Shasta Division, headquarters at Dunsmuir, Cal., vice H. Stillman, appointed Engineer of Tests, headquarters at Dunsmuir, Cal. The latter succeeds James H. Scott, resigned.

Southern Pacific (of California).—At the election at San Francisco, April 14, the following officers were chosen: Charles F. Crocker, President; W. V. Huntington, Vice-President; N. T. Smith, Treasurer; J. L. Willout, Secretary. These, with C. P. Huntington, Charles Mayns and A. N. Towne, form the Board of Directors. The only change was the substitution of W. V. Huntington for Timothy Hopkins.

RAILROAD CONSTRUCTION, Incorporations, Surveys, Etc.

Adirondack & St. Lawrence.—Tracklaying was completed as far as White Lake Corners, N. Y., last week, and will probably reach the Moose River in a month. The road has been practically graded along the north bank of the Moose River to Old Forge, on the Fulton Lakes. Between that point and Bog River, north of Smith's Lake, about 600 men are working on the grading which is being done by the Enterprise Contract Co., of 45 Broadway, New York. The grading between Old Forge and Bog River is probably the heaviest section on the road, and includes some heavy rock work, and so far less than 10 miles has been graded. The route is via Buck Pond, Twitchell Creek, Beaver River, Albany Lake, now known as Ne-ha-sa-ne Lake; Lake Lila, formerly Smith's Lake and Bog River. The maximum grade is 80 ft. to the mile, and the maximum curvature is six degrees. There are four iron bridges with spans of

50 ft., 43 ft. and 98 ft.; two spans each 60 ft. long, and one span of 75 ft. The longest trestle work is 300 ft. Surveys will soon be made for several branches, which will be graded during the summer.

Brady Bros., of Bayonne City, N. J., are working about 700 men on the grading near the northern end of the line between Wolf Pond and Rainbow Station, N. Y., 15 miles. The work is not difficult, the material is mostly sand, though in the vicinity of Loon Lake there is about two miles of harder material, some solid rock and large boulders. The maximum grade is 1.62 per cent., and the maximum curves 6 degrees. There are no important bridges on this part of the line, but the Saranac River trestle is about 400 ft. long and 50 ft. high, and is built of Georgia pine on a pile foundation. There is one other double deck trestle, and the rest are all small trestles built of round timber (temporary). This work is to be pushed to completion as soon as possible, for the track is laid up to it on either end. This part of the road is parallel to the Chateaugay road for a distance of about 10 miles. Inman, the section headquarters, is about in the centre of the work, and is 25 miles southwest of Malone.

Altoona, Clearfield & Northern.—The directors have voted to begin construction work immediately on the proposed extension to Coalport, Pa. The line will begin at the terminus near Wopsononock, and the grade will be made standard gauge, though the track will be narrow gauge. The line will be about 15 miles long, and will reach the coal mines in the southern part of Clearfield County.

Astoria & Portland.—The contract for grading 85 miles of the road has been awarded to Corey Bros. & Co., of Utah, who now have a contract on the Great Northern Pacific extension. The contractors will put 2,000 men at work in a short time.

Austin & Northwestern.—A temporary bridge has been built over the Colorado River west of Fairland, Tex., and the tracklaying which has been finished to that point will soon be resumed west of the river. The grading on the last 20 miles between the Colorado River and Llano has been practically completed, and is about ready for the track.

A branch two miles long is being built from a point near Ledbetter, Tex., to stone quarries, from which a traffic averaging from 75 to 100 cars a day is expected for the Galveston jetty work.

Baltimore & Ohio.—The company has begun work on the cut at North Branch, Md. The cut will be over a mile in length and in making it nearly a hundred thousand cubic yards in clay will have to be removed. The cut is being made alongside the two main tracks of the road and is understood to be for the purpose of building another track.

Work on the Baltimore & Ohio yard improvement at South Cumberland, Md., is progressing quite rapidly. The large stone bridge is completed, and Messrs. Ryan & McDonald are doing the excavating with steam shovels and have nearly a fourth of the earth removed.

Bartow & Plant City.—The locating surveys for this line between Bartow and Plant City, Fla., will be commenced about April 25. Preliminary surveys have already been made for 10 miles and the right of way secured. Contracts for the grading will be let as soon as the location has been completed. James L. Johnson, of Bartow, Fla., is Chief Engineer.

Bellefonte Central.—The completion of this road to State College, Pa., has been recently referred to. The road is situated in Centre County, and the main line extends from Bellefonte to State College, 20 miles, and there are branches to ore mines, making the total length of the road 39 miles. The extension of the track into State College has just been completed, and no other extensions are now contemplated. Robert Frazer, 209 South Third street, Philadelphia, is President.

Bentonville & Sulphur Springs.—The company filed articles of incorporation in Arkansas last week with a capital stock of $375,000. The road will extend from Bentonville, Benton County, in a northerly direction, about eight miles, to a point near Dug Hill; thence westerly to Sulphur Springs, Benton County, a distance of 25 miles.

Bucksport & Elk River.—Frank Herrick, an engineer of Humboldt, Nev., has recently made a survey for a proposed branch about four miles long from the mouth of the north fork of Elk River along that stream to Bridge Creek. The branch is to be built principally for logging traffic and will reach timber owned by Dolbeer Carson.

Burlington, Cedar Rapids & Northern.—President Ives confirms the report that the company has decided to build immediately a line between Forest City and Estherville, Ia. It is proposed to let the contracts for the grading and tracklaying west of Forest City within the next 10 days, and about 40 miles beyond that point toward Estherville will be constructed this year. The work will be comparatively light, with very little bridging. No other new construction work will be undertaken this year.

Calgary & Edmonton.—It is reported that construction will be resumed on the southern section this month. This is that part of the road between Calgary and Fort McLeod, Alberta, 170 miles. Track was laid last fall 56 miles south of Calgary to Mosquito Creek.

California Midland.—The preliminary survey south of Stockton, Cal., was begun last week, a party of 10 having been organized under the charge of Emery Oliver, of Portland, Or., Assistant Engineer. The engineers will probably be in the field three months and will run a route west of the Southern Pacific and parallel to it for about 25 miles to Modesto, and the Southern Pacific will not be crossed until Merced, 75 miles south of Stockton, is reached. The survey is to be continued from that point to Visalia.

Canadian Pacific.—The various extensions of the lines in Manitoba, which are likely to be built this year, are summed up in the following report from one of the officers: It is the company's intention early this season to extend the Souris Branch from its present terminus, Oxbow, Man., about 40 miles west. The greater part of the grading for this has already been done. The company is also extending the Deloraine line to a junction with the Souris Branch at Napinka, Man., a distance of about 18 miles. About one-third of this grading is now done. There is also a probability that the Glenboro line will be extended to a junction with the Souris Branch at Souris. The distance will be about 18½ miles.

It is currently reported that as soon as the engineers finish the survey from Fort McLeod, Alberta, to the Crow's Nest Pass in the Rocky Mountains, they will commence the location of a line from Fort McLeod to Medicine Hat.

Chicago, Burlington & Quincy.—Quigley & Co., of St. Louis, are reported to have the contract to build a branch about 30 miles long as a cut-off to the Missouri River. The new line will begin about Richfield, near the terminus of the St. Louis, Keokuk & Northwestern, and is to extend southwest to near Bellefontaine Bluffs, 15 miles below St. Charles, and at the site of the proposed bridge over the Missouri River.

Chicago & Eastern Illinois.—W. P. Chapman, of Elgin, Ill., has the contract for the construction of the second track between Momence and Danville, Ill.

Chickamauga & Durham.—Good weather has been favorable to work on the construction of this road. Two camps of convicts have been moved from the Round Mountain mines to Chickamauga, Ga., to work on the tracklaying, which is now progressing favorably. About two miles of siding has been already put in, and as soon as the siding is completed work will be pushed on the main line.

Cleveland Belt & Terminal.—The contract has been let to T. B. Townsend & Co., of Zanesville, O., for completing the work on this line at Cleveland, O. The work will be commenced immediately and is expected to make rapid progress. Part of the route is over a partially constructed and abandoned line.

Cleveland, Cincinnati, Chicago & St. Louis.—The Wayne County Commissioners have ordered a special election to be held in Wayne, Boston and Franklin townships, Ind., May 24, to decide the question of an appropriation to aid in building the Brookville, Richmond & Union City branch. Wayne Township is asked for $175,000 and the other two for $12,000 each.

Colorado Midland.—The General Manager states that the company has decided to build the proposed Cripple Creek branch at once. The line will involve some heavy work and will be about 13 miles long, connecting with the main line at Hayden, near Florissant, Col.

Columbus & Pickensville.—This is the correct name of the company heretofore reported as the Alabama & Mississippi Railroad. The survey for the line southeast of Columbus, Miss., is now nearly completed and the officers propose to begin construction work on the line in 60 days and then push the work as rapidly as possible. The road will be about 20 miles long, extending to Pickensville, Ala., but about 13 miles of the distance has already been graded, the work having been done by a former company and recently acquired by the present company. The route will be practically level except at a few points where short grades of 75 ft. to the mile will be necessary. C. W. Mills, of Columbus, Miss., is the Vice-President and Chief Engineer.

Davenport, Middleburg & Durham.—The articles of incorporation of this company were filed in New York this week. The road is to extend from East Davenport, Delaware County, through the towns of Davenport and Harpersfield, Delaware County; Jefferson, Blenheim, Fulton, Middleburg and Broome, Schoharie County; Rensselaerville, Albany County, and Durham, Greene County, terminating at East Durham. The road will be 60 miles long. The capital stock is $600,000.

Dayton, Lebanon & Cincinnati.—Contracts for grading part of the line south of Dayton, O., will probably be awarded in May. The line is to extend from Dayton south through Centerville to Dodd's, near Lebanon, the northern terminus of the Cincinnati, Lebanon & Northern, and will be about 25 miles long. Stephen J. Patterson, of Dayton, is President of the company, and H. A. Talbot is Chief Engineer.

Denver, Apex & Western.—Scullon & Stacy, of St. Louis, are reported to be arranging to build this road between Denver and Georgetown, Col., a distance of 55 miles.

Duluth, Messabe & Northern.—Rapid progress is being made on the grading. This company will, for the present, use the terminals and ore docks of the Duluth & Winnipeg on Allouez Bay, Superior.

Duluth, Mississippi River & Northern.—The first 15 miles north of Swan River, Minn., near La Prairie, has been located and grading has been commenced by Grant, Foley Bros. & Guthrie, of St. Paul, who have the contract for this section of the road. The line is projected from a point on the Mississippi River in section 9, T. 52 N., R. 23 W., in a northeasterly direction for a distance of 35 miles, crossing the Duluth & Winnipeg about one mile east of Swan River station and thence extending to the Messabe iron range in northern Minnesota. It is expected to complete the entire line this season, but for some time the traffic on the line will be almost entirely lumber. Wells, Stone & Co., of Saginaw, Mich., are chiefly interested in the project. Most of the work will be light, with very little bridging and 45-lb. rails will be used. W. A. Dafter, of Swan River, Minn., is the Chief Engineer.

Duluth & Winnipeg.—The Consolidated Land Co., of Superior, Wis., has deeded to this company 115 acres of land for terminal and dock purposes. The land company also builds the road from New Duluth to these terminal properties. The contract for driving the piling for the ore docks has been let.

Eagle's Mere.—It is proposed to put 300 or 400 men at work on the grading north of the Williamsport & North Branch road very soon, and it is intended to have the road completed by June 15 as far as Eagle's Mere, a point seven miles north of the connection with the Williamsport & North Branch. The road is being built by the Eagle's Mere Construction Co., of which B. G. Welch, of Hughesville, Pa., is General Manager.

East Line & Red River.—Judge Key, in whose court the receivership of the road is vested, this week approved the contract made by Receiver Giles for widening to standard gauge that portion of the line which is now narrow gauge and authorizing the issuance of certificates to the amount of $400,000. The road will be changed to standard gauge throughout in about four months.

Ellwood Connecting.—The company was chartered at Harrisburg, Pa., last week. It will build a line a mile long from the tracks of the Pittsburgh & Lake Erie via West Ellwood, Beaver County, crossing Beaver Creek to a point on the tracks of the Beaver & Ellwood road in North Sewickley Township. The capital is $50,000. The Directors are James H. Reed, John G. Robinson, M. Baily and George B. Motheral.

Findlay Belt.—The construction work on this road is nearing completion, and the tracklaying will be resumed May 1. The belt line will be over seven miles long, and will connect the four roads entering Findlay, O. Each road will have an equal share of the capital stock and all will have the same interest. The stock is $150,000. The road will connect all the manufacturing establishments with the main lines.

Findlay, Fort Wayne & Western.—The engineers of the road have completed the survey of the line from Findlay, O., to Greenwich, Huron County, where a connection will be made with the Cleveland, Cincinnati, Chicago & St. Louis. The right-of-way is being secured and it is the intention of the officers of the road to complete this extension the coming summer.

Florence, Cripple Creek & State Line.—The preliminary survey for this new road has been completed to Fremont, Col. The engineers began work about six weeks ago, as soon as the company was organized, and have surveyed a line 40 miles long from Florence to Cripple Creek and Fremont. The maximum grade is four per cent., but with the traffic the maximum grade is two per cent. on about one mile of the divide near Fremont. There will be no tunnels and only six bridges will be built. The surveying party was in charge of C. Thorp, Chief Engineer.

Georgia, Carolina & Northern.—Passenger trains on the entire road have begun running, the first train running to Atlanta April 17. The distance from Atlanta to Athens, Ga., is 67 miles, and to Elberton, 101 miles. Trains will be run through to Charlotte, N. C., 200 miles, the run being made in 11 hours, the same time as via the Richmond & Danville trains. The difficulty about the company's entrance into Atlanta is still unsettled, and the suit for right of way is pending in the courts.

Glade Creek & Piney River.—A charter was granted to this company in West Virginia last week. This road is to extend from Glade Creek, in Raleigh County, to Piney River, in the same county. The principal office is at Coal Gate, in Raleigh County. The capital is $5,000. John McCreery, of Raleigh County, and others are the incorporators.

Great Northern—E. H. Beckler, the Chief Engineer of the Pacific extension, spoke as follows last week regarding the progress of the work on the line: "The road will be connected between Sand Point and Kalispell, Mont., by April 25. Track is being laid at the rate of four miles a day, and the line from Sand Point is now within 10 miles of Lake City, on the upper Kootenay. We shall lay no track westward from the crossing of the Pend d'Oreille River until we are connected through to the East, as we will require more material, and naturally prefer to haul it over our own road. The track will probably be laid into Spokane by May 20. West of Harrington the work is also progressing rapidly, and a number of contractors are working west of that point."

Greeley, St Vrain & Denver.—Chief Engineer John S. Titcomb, of Denver, is now preparing the profiles and estimates for this road. The survey has just been completed and it is estimated that the old grade south of Greeley can be repaired for about $40,000. The road will be 28 miles long and will pass through a fertile agricultural country along St. Vrain Creek to the connection with the Denver, Utah & Pacific at Idaho Creek, Col., and the indications are that the new road will be in operation this year. The Burlington will be asked to assist in building the line east of Greeley and it is thought the company will agree to do this as the coal and other freight of Boulder County could then be shipped east over its line without going through the crowded Denver yards.

Gurley & Paint Rock Valley.—The contract has been awarded to Allen, Mosely & Co., of Rocky Mount, Va., for the construction of 30 miles of the road, commencing at Gurley, Ala., and running northeasterly up the Paint Rock River to the foot of Cumberland Mountain. The work is to be completed by December.

Iowa Central.—A party of engineers began the survey last week for a proposed line into Ottumwa, Ia., and so soon as they have completed their estimates they will be forwarded to the directors in the East. The line now being run will be about 10 miles long, and will begin at Fremont and extend south into Ottumwa.

Kelley's Creek.—Dr. D. Ward, of Detroit, Mich., is building the above named line from the Kanawha River along the Valley of Kelley's Creek in Kanawha County, W. Va., to coal and timber lands owned by himself 12 miles from the river. The road is owned by Dr. Ward and will be used to carry the coal and timber products of his lands. It will be standard gauge and will connect with the roads now operating in the Kanawha Valley.

Lake Shore & Michigan Southern.—The company has undertaken the improvement of the branch between Fayette and Grosvenor, near Adrian, Mich., and it is said that the work which has been done on the 23 miles of this branch within the last two months practically amounts to rebuilding it. It is reported that the grading has been begun west of Fremont, and that the work is to be continued to the main line near Goshen, Ind., to complete a new route between Toledo and Chicago.

Louisville, St. Louis & Texas.—The survey is reported to have been recently made for a line from West Point easterly into the city of Louisville, a distance of 20 miles, and it is reported that the road may be built this summer. The company has trackage rights at present over the line of the Newport News & Mississippi Valley between these towns.

Meadow Creek.—E. S. Hackett, of Coit, W. Va., has recently made surveys for this road, which is to be built to develop coal fields in the New River coal region in Fayette County. The route is through a mountainous country and the grading will be very heavy, but it is expected to complete the road in August. J. L. Beaury, of Beaury, W. Va., is President of the company.

Mexican, Cuernavaca & Pacific.—Grading has been finished from the city of Mexico to Castañeda, Mex., and is being rapidly pushed forward. One hundred tons of rails arrived at Vera Cruz last week, 1,000 tons are on the way to Tampico, and 4,000 tons more have been ordered. This amount is sufficient to complete the line to Contreras.

Mexican Roads.—The concession for a road from Salamanca to Valle de Santiago and Jaral, Mex., has been modified so that the company is now empowered to prolong the line from Jaral to a connection with the Mexican National road.

By a new contract, the Merida & Campeche Railway Co. must, within six months, build four kilometres of its line in addition to the 129 kilometres already completed, and in each subsequent year construct at least 10 kilometres—five kilometres from Merida toward Calkini and five kilometres from Campeche toward Calkini.

Michigan Central.—Hereafter the road will use the tracks of the Grand Rapids & Indiana road in entering Grand Rapids, Mich., instead of the Chicago & West Michigan.

Minneapolis, St. Paul & Sault Ste. Marie.—The grading will probably be resumed this summer on an extension west of Boynton, S. D., which may be continued to the partly graded road between Aberdeen and Bismarck, N. D. Contracts are reported to have been let for the part of the work near Boynton, and the distance to the old grade is about 45 miles.

Missouri Southeastern.—Four or five miles of grading has been completed on the line which is being built from Bloomfield, Mo., to a junction with the St. Louis Southwestern, a distance of seven miles.

Nelson & Fort Sheppard.—The bill granting a charter to this company with a land grant of about 750,000 acres passed the legislature of British Columbia last week with a nearly unanimous vote. The bill giving the company a Dominion charter has not yet been acted upon, but will be strongly opposed when the application comes up for consideration. The road is projected as an extension of the Spokane & Northern, and is to extend from Fort Sheppard to Nelson, B. C., a distance of about 66 miles.

New Orleans Belt.—An ordinance granting a franchise to Adolph Schrieber of New Orleans and others for a belt road was passed by the New Orleans Council last week. The new company proposes to build on what is known as the outer route, encircling the city near its limits and connecting with the various railroads. The railroads are opposed to the project, and it is not likely that the road can be built without their co-operation.

New Roads.—The engineers who are surveying the road proposed by T. P. Murray, of Salt Lake City, have completed a preliminary line to Dugway, Utah, near the Nevada state line, about 100 miles southwest of Salt Lake City. The chief engineer reports that the engineers are now returning and cross-sectioning the line toward Stockton and Salt Lake City.

John R. Rutigan, the contractor for the coal branch south of the Rio Grande, near Piedras Negras, has completed the work from the connection with the Mexican International east to the Fuente coal mines, near the Rio Grande, and has transferred his outfit to the Durango extension of the Mexican International.

J. C. Blandford, Ignatius Payne and others are interested in a proposed road from West Louisville to Owensboro, Ky.

J. P. Nelson, of San Antonio, Tex., reports that the citizens of Corpus Christi, Tex., are endeavoring to raise $300,000 for the purpose of building a railroad from Corpus Christi to Brownsville, and have made him a proposition to take charge of the project and build the road. Over 50 miles of the road has been partly graded south of Corpus Christi.

New York, Susquehanna & Western.—A force of about 500 men are reported to be working west of the present terminus of the road, near Stroudsburg, Pa., on an extension which is being built from Gravel Place, through the valley north of the Pocono Mountains to the south of, but nearly parallel to the main line of the Delaware, Lackawanna & Western.

Northern Pacific.—Grading on the South Bend line has been completed for about 10 miles beyond Pe Ell, Wash., and about 23 miles of the track has been ballasted west of Chehalis, where the road branches off from the Western division. The fifth and last bridge across the Chehalis River, near Pe Ell, is now being erected and as soon as it is completed the track will be laid across the river and will then soon reach the Pacific coast terminus of the branch at South Bend, 56 miles west of Chehalis. The line will probably be in operation to that point in August.

The company has begun the operation of 11 miles more of its Gray's Harbor branch between Montesano and South Aberdeen, Wash. The remainder of the line, from South Aberdeen to Ocosta, Wash., will be finished and put in operation during the coming summer.

Ohio Valley.—Work on the extension from Princeton to Hopkinsville, Ky., has been greatly impeded in the last few weeks by heavy rainstorms. The embankments for five of the bridges were washed away and there will be considerable delay in repairing the damage. The contractors, however, state that the line can be completed for operation by July 1.

Owensboro, Falls of Rough & Green River.—The surveys for the proposed extension to Horse Branch, Ky., are now completed and contracts for grading and other work will be let as soon as the location can be made. The surveys have been made from Fordsville, the terminus of the road, and Reynolds, a station about four miles east, south to White River to a point on the Newport News & Mississippi Valley road, a distance of about 10 miles. There will be very little difficult work, but the branch will cross two divides where the maximum grade will be 75 ft. to the mile; the maximum curvature will be nine degrees. Two iron bridges will be built, each with a single span 100 ft. long.

Pan-American.—The contractors have so far completed only about five miles of the tracklaying south of Victoria, Tex., although they have been working on the road since December. J. H. Barrett, who has the contract for completing the first 10 miles, which will bring the work to the Guadaloupe River, expects to finish his contract early in May.

Pennsylvania.—The company has a force of men at work double-tracking the lower end of the new Trenton branch, between Glen Loch and the Schuylkill River. The traffic over the branch is heavy, 26,000 cars having passed over it between the Schuylkill and Morrisville, Pa., during the month of March.

Perry County.—The injunction obtained by the Newport & Sherman's Valley road to prevent this company crossing its tracks has been dissolved and the extension to Loysville, Pa., will be resumed immediately. The line which is now being built extends from New Bloomfield west about 12 miles to Landisburg and Loysville, and the principal work now to be done is the tracklaying.

Philadelphia & Bustleton.—The Philadelphia City Council has granted an ordinance to build its road through the Thirty-third and Thirty-fifth Wards from a point at Front and Erie Avenue to a point at Hoff and Boileau streets, near Frankford. The road will be a branch of the Pennsylvania, beginning at Harts lane on the New York Division and extending northward eight miles to Bustleton. The building of the new line by the Pennsylvania is not an assured fact, principally owing to a number of property owners placing the value of the land far above what was asked before the new line was contemplated.

Philadelphia & Northern.—The company was chartered in Pennsylvania last week, with a capital stock of $600,000. The road is to extend from a point on the Germantown branch of the Philadelphia, Germantown & Norristown road near the intersection of Western street and Duncannon street, Philadelphia, to a point of connection with the North Pennsylvania road, at Glenside, Montgomery County, Pa. The length of the road would be about six miles. E. Lawrence Fell, of Philadelphia, is President.

Philadelphia & Reading.—The company is now preparing plans and surveys for the short branch to Frankford, which is to begin at Crescentville on the Philadelphia & Newtown road. There will also be a branch line running from the North Pennsylvania line at Tabor, which will connect with the Philadelphia & Newtown road. Nearly all the right of way has been secured and in a few days the work of grading on the new road, which is to be about three miles long, will be begun.

The work of surveying for the proposed West Chester branch from West Chester to Exton or Glen Loch on the Chester Valley line of the Reading, nine miles, was commenced on Wednesday of last week.

A movement is on foot by the property owners of Frankford, Tacony, Holmesburg and Bustleton (suburbs of Philadelphia), to petition the company to extend its tracks from Frankford to the above places, and it is said a meeting will soon be held for this purpose. It is thought the road can be built from Frankford to Holmesburg for $200,000.

Pittsburgh, Lake Erie & Chicago.—A charter for this company was filed at Columbus, O., last week. The capital stock is $100,000.

Port Arthur, Duluth & Western.—The Ontario Legislature has passed a bill to grant this company a cash subsidy of $3,000 a mile for the construction of seven miles of road from the east end of Gunflint Lake to a point near Magnetic Lake, and a cash subsidy of $2,000 a mile for the construction of three and a half miles of the Kakabeka branch.

Potomac Valley.—Engineer O. C. Vandeventer, of the Western Maryland, made a trip over the Potomac Valley and Western Maryland last week in company with President Hood. If the weather is at all favorable, the road will be completed and the trains running by June 1. The grading is all done, and the blasting is well under way. Of the bridge at Cherry Run one span is up and the other four are delivered on the ground. The trestling at that point is progressing, 150 bents of the 182 being up, and nearly all of the rest framed. The tracklaying began at the Hagerstown end on Monday.

Rockport & Harbor Island.—A charter for this company was issued in Texas last week. The new company is to build a road about nine miles long between Rockport and Harbor Island on Aransas Bay. The capital stock is $100,000.

Santa Fe, Prescott & Phœnix.—The contractors report that the first 17 miles south of Ash Fork, Ariz., on the Atlantic & Pacific, has been completed, and that about 500 men are now at work south of that point. The construction has been delayed by the heavy snow fall, but as soon as it melts it is proposed to put 1,000 men at work. On the southern end of the line the grading for the first 20 miles north of Prescott, which was let to Richard Toohey, has been completed and work will be resumed on that end of the line as soon as new contracts can be awarded. G. W. Vaughn has been appointed Chief Engineer.

Santa Fe & Santa Monica.—The company has been incorporated in California to build a branch of the Southern California from Mesmer, between Inglewood and Bellona, to Santa Monica, five miles.

San Jose & San Francisco Transportation Co.—This company was organized at San Jose, Cal., last week by W. R. A. Johnson and Joseph H. Rucker and others and the articles of incorporation were filed April 8. It is proposed to build a standard gauge road from San Jose north to Port San Jose at the lower end of San Francisco Bay and about three miles from Alviso. The new line will be about 20 miles long, and the projectors state that they will begin the construction as soon as the right of way has been secured.

Siuslaw & Eastern.—The projectors have asked the town of Eugene City, Or., for a $100,000 subsidy for the construction of a line west to Florence on the Pacific coast, and it is expected that the town will accept the proposition. The line was partly graded last fall and will be about 50 miles long, the terminus being on Siuslaw Bay in Lane County.

Southern Pacific.—The citizens of Yolo and Lake counties, Cal., will soon appoint a committee to visit C. P. Huntington for the purpose of asking him to build a line from Woodland, west of Sacramento, to connect with its Vaca Valley & Clear Lake branch at Madison, about 10 miles west.

Turton & Knox, of Sacramento, Cal., are the contractors for the new road south of Bakersfield, Cal. This branch is to extend through the Kern Valley about 50 miles to reach large asphalt and bitumen deposits at the Sierra foot hills. It is reported that as soon as the main line is built a branch will be constructed to San Miguel, near San Buenaventura, Cal.

Stoneham.—The prospects for building this road this summer seem to be dwindling and indeed the project is now practically abandoned. The Boston & Maine, which was to have built the branch, is reported to have dropped it on account of the cost of the work. A number of surveys have been made for a line four or five miles long to connect with its Western Division near Oak Grove Station. The town of Stoneham had voted $50,000 toward building the road and the Boston & Maine had agreed to construct the branch.

Texas & Pacific.—The city council, of El Paso, Tex., has passed an ordinance granting the railroad the right of way along First and Sixth streets, by which direct connections between the road and the Atchison, Topeka & Santa Fe and Mexican Central can be made.

Tolman's Landing & Vallecitos.—This company has been incorporated in California with the following directors: George B. Tolman, Marian Tolman, R. Gilbert, H. M. Shaw and Alfred S. Moore. The capital stock is fixed at $2,250,000, of which $40,000 has thus far been subscribed. The company proposes to construct a line from Tolman's Landing, Fresno County, to Vallecitos, in San Benito.

Watertown, Sioux City & Duluth.—On account of the failure of the Land Office officials at Watertown to place the time of filing on the plats of the survey through the Sisseton Reservation, the General Land Office returned them for correction. This oversight will prove to be an expensive one for the company, as all the land will have been located or filed on by settlers before the filing of the maps can be completed, it being necessary to return them to Watertown for that purpose. The company will now be compelled to purchase or condemn its right of way instead of having it reserved by the Government, when the reservation was opened for settlement on the 15th inst.

Winnipeg & Atlantic.—This company is applying to the Dominion Parliament for a charter to build a line from Winnipeg to Seven Islands Bay, Quebec.

GENERAL RAILROAD NEWS.

Baltimore & Ohio.—The company has resumed dividend payments, which were suspended in 1887, the directors declaring a cash dividend of 1½ per cent., payable out of the earnings of the road for the three months ending Dec. 31, 1891. It was stated when the declaration of the dividend was announced that in the five years since the dividends were suspended the company has expended nearly $5,000,000 on betterments, which was paid out of net earnings.

The earnings for March on the entire system were $2,026,163; increase, $181,982; expenses, $1,529,859; increase, $199,027; net decrease, $17,044. The earnings and expenses for the six months of the fiscal year, compared with the same months of the previous fiscal year, were as follows: On the lines east of the Ohio River—Earnings, $9,499,016; increase, $533,683; operating expenses, $6,756,162; increase, $722,282; net decrease, $188,589. On the lines west of the Ohio River—Earnings, $3,146,864; increase, $404,178; operating expenses, $2,604,506; increase, $286,310; net increase, $116,868. The summary of the entire system, east and west of the Ohio River, shows gross earnings of $12,645,880; increase, $937,872; operating expenses, $9,360,669; increase, $1,000,592; net increase, $71,720.

Central Massachusetts.—The railroad committee of the Massachusetts legislature this week reported a bill to permit the company to issue $500,000 in new bonds, to pay for permanent additions and improvements and equipment.

Cincinnati, Hamilton & Dayton.—A special meeting has of stockholders will be held at Cincinnati on May 9 at which the principal question to come up will be the proposed increase of the capital stock to the extent of $4,000,000, and the issue of $3,000,000 five per cent. general mortgage bonds. The principal purpose in issuing this new capital is to provide for the extension of the double track, to build a number of branches and for increasing the equipment.

East Tennessee, Virginia & Georgia.—A bill in chancery was filed at Knoxville, Tenn., April 15, by L. A Morton and W. J. Walsh, of Chattanooga, minority stockholders of the company, asking for a receiver. The action is taken to prevent this road being consolidated with the Richmond & Danville under the name of the Great Southern Railroad Company, as proposed by the Olcott Reorganization Committee of the Richmond Terminal.

Galveston, Houston & Henderson.—The minority stockholders of the company, holding about $400,000 of its stock, began a suit in the State district court at Houston, Tex., last week, asking for the appointment of a receiver. The suit has been transferred to the United States Court. The road is about 50 miles long, extending from Galveston to Houston, and has been operated by the International Great Northern since 1883.

Grand Trunk.—The Directors make the following comments on the business for the last year, in the annual report just published: "The Directors regret that the anticipations fairly indulged in respecting the advantages likely to be derived from the last harvest were not more speedily realized. The lumber trade was seriously interfered with by the collapse of the South American demand. Local traffic was continuously disappointing. The expected development of business consequent upon returning prosperity was greatly delayed, but the long-hoped-for improvement appears at length to have begun. The Directors confidently anticipate a satisfactory weekly increase for the next six months. There appears, also, to be a better disposition among American companies to maintain rates. The board says there is now no necessity for further extensions. Every effort must be made to reduce expenses by consolidating the different divisions. The way has been prepared for legislation at the next session incorporating all the lines in the Grand Trunk system in Canada in one undertaking."

Lake Shore & Michigan Southern.—An agreement has been reached between the road and the town of Hamburg, N. Y., near Buffalo, in regard to grade crossings. The railroad will build overhead crossings at all highways, the town to incur no expense whatever, except to change the grade to the line of the company's property.

Martha's Vineyard.—The trustees of the first mortgage bonds issued in 1874 and 1885 announce the sale of this road at foreclosure at Boston, May 21. These foreclosure proceedings were begun by the Old Colony in 1890, and the road has been operated by that company for the last few years. It is about eight miles long.

New York & New England.—N. P. Goldsmith & Co., of Boston, who own about 60 shares of the company's stock, published last week an open letter to the directors criticising various acts of the management, some of which occurred two or three years ago. The letter states that the firm will hold the directors personally responsible if they pay the 3½ per cent. dividend on the preferred stock voted to be paid on May 2, and requests them to rescind the vote. They say that, according to the last annual report, the dividends paid on the preferred stock in 1891 amounted to $210,000, while the net earnings in 1891 applicable to the payment of dividends were only $81,826; that since Dec. 31, 1891, $200,000 of additional preferred stock has been issued and sold by the company; that the company for the six months ending April 1 last has failed to earn the 3½ per cent. dividend which it is now proposed to pay; that there was a net deficit in the treasury on Jan. 1 of $431,913.73, and that the deficit still exists. They also allege that the Providence & Springfield and the Woonsocket & Pascoag have been operated at a loss, that the roads were purchased by some of the directors of the New England and then leased to the company at a guarantee of six per cent. on the stock. Chairman Bostwick has replied energetically to the circular. The question of paying dividends was determined after a

most thorough investigation, he said, and was settled with only one dissenting voice. In 1887 there was a deficiency of about $735,000 in the company's profit and loss account, but this had been reduced since then by about $240,000. The dividends had not been earned in the precise period for which they were paid, but as they were cumulative it was thought best to authorize their payment from the surplus of earnings over expenses since 1887. The directors had been assured by counsel that this action was entirely legal. He defends the criticised leases by saying that the roads are valuable feeders and were wanted by competitors. He admits that there has been considerable bad management, but throws the responsibility on the late General Manager.

The night express between Brooklyn and Boston over the Long Island and the New York and New England roads has been taken off and a day train put on in its place. The new train leaves Boston at noon and reaches there on its eastward trip at 6:30 p. m. These figures seem to indicate that the train will, east of Hartford, be a part of the New York day express which for a long time has been run at these hours. The train leaves Brooklyn 2 hours and 5 minutes later than the time the corresponding train starts from the Grand Central Depot and the return train arrives 2¼ hours later.

New York, Ontario & Western.—At a special meeting of stockholders in New York, April 20, the financial plans recently submitted to the Board of Directors of the company were approved. The stockholders also approved the issue of $20,000,000 four per cent. bonds, and it is proposed to retire the $4,000,000 six per cent. bonds outstanding, which may be redeemed at 110. A sufficient amount of the new four per cent. bonds authorized will also be set apart to retire the fives maturing in 1889. The balance will be used for additions to the property and new equipment.

Northern Pacific.—The statement of earnings for February, including the Wisconsin Central, is as follows:

	1892.	1891.	Inc. or dec
Gross Earnings	$1,946,325	$1,796,325	I. $149,842
Operating expenses	1,291,189	1,275,183	I. 16,006
Net earnings	$655,136	$521,300	I. $133,836
Other income	181,950	246,475	D. 64,525
Total net income	$837,087	$767,775	I. $69,306
Int., rentals, etc	1,127,638	938,224	I. 188,814
Deficit	$289,951	$170,449	I. $119,502

For the eight months of the fiscal year the two companies report as follows:

	1892.	1891.	Inc. or dec.
Gross earnings	$20,900,612	$21,387,016	D. $486,404
Operating expenses	12,323,747	12,523,449	D. 199,702
Net earnings	$8,576,865	$8,863,567	D. $286,702
Other income	1,233,045	567,007	I. 666,038
Total income	$9,809,910	$9,430,574	I. 379,336
Fixed charges	8,796,077	8,057,315	I. 738,762
Surplus	$1,013,833	$1,373,259	D. $359,426

Pennsylvania, Poughkeepsie & Boston.—The railroad has not been formally leased by the Philadelphia & Reading, as announced; but it is understood that an agreement has been made by which the Reading will operate the road, which is now in a receiver's hands, and that ultimataly it will be leased or controlled outright. The line has been operated for some time in harmony with Reading.

Richmond & West Point Terminal.—A majority of the securities of the Terminal Co. were deposited with the Olcott Reorganization Committee by Thursday of last week, the last day announced for the deposit of securities. The committee reported that up to that date the following amounts of Richmond Terminal securities had been deposited: Of the common stock, $47,200,000 out of $70,000,000; of the preferred stock, $3,000,000 out of $5,000,000; of the 6 per cent. consolidated trust bonds, $1,300,000 out of $5,500,000; of the collateral trust bonds, $7,020,000 out of $10,679,000, making a total of $58,520,000 securities out of $91,17,9000. The deposits of East Tennessee, Virginia & Georgia securities, added to the Terminal Co.'s holdings, have been sufficient to give the control of a majority of the securities. The committee has made a later report giving the amount of securities deposited under the plan of reorganization up to April 19 was as follows: Of Richmond Terminal securities: Common stock, $56,337,500; preferred stock, $3,471,600; 6 per cent. collateral trust bonds, $1,766,000, and 5 per cent. collateral trust bonds, $7,495,000; total, $69,070,100. Of East Tennessee, Virginia & Georgia: Common stock, $10,456,500; second preferred stock, $5,089,000; first preferred stock, $638,000, and other stocks, $1,235,000. Underlying securities: East Tennessee bonds, $435,000; Richmond & Danville, $429,000; Virginia Midland, $182,000; Georgia Pacific firsts, $472,500; Georgia Pacific incomes, $238,500; Western North Carolina, $55,000; Columbia & Greenville, $55,000, and various branch roads, $76,500; the total deposits aggregating $88,432,700 Deposits of other stocks and bonds to the amount of $2,000,000 have been made by cable and letter.

Savannah, Americus & Montgomery.—The company ran its first through train from Americus, Ga., to Montgomery, Ala., on last Sunday. The company will continue to run a freight and passenger train daily between these points.

Schuylkill River East Side.—The Baltimore & Ohio, through its counsel, has made answer why the Philadelphia & Reading is not entitled to one-half of the stock of this company, and declares that the bonds were without market value, and the Philadelphia & Reading could furnish no means, as agreed, for the construction of the road in litigation. As it had to bear the entire burden of this construction, it was entitled to all the stock, the surplus being held as its only security. "Under any view of the contracts," states the answer, "the stock was delivered to pay for the costs of construction." It declares that the Reading's refusal of traffic interchange at the Schuylkill Road junction from January, 1887, to March, 1889, amounted to a loss to the Baltimore & Ohio, in passenger traffic alone, of $760,000.

Tennessee Midland.—A meeting of the stockholders has been called to be held at Memphis, Tenn., May 6, to authorize the issue of first mortgage five per cent. bonds at the rate of $11,000 a mile and of second mortgage bonds at the rate of $9,000 a mile, to refund the present bonds and other indebtedness.

Union Pacific.—The statement of earnings for February shows a more favorable comparison with the preceding year than the January statement. There were losses on the Oregon Short Line & Utah Northern, and the Oregon Railway & Navigation Co., but the net increase for the system is $123,374. The figures are given in the following tables:

OREGON SHORT LINE & UTAH NORTHERN.

Month of February:	1892.	1891.	Inc. or dec.
Gross earnings	$453,457	$544,640	D. $91,183
Oper. expenses	308,946	354,947	D 46,201
Surplus	$144,511	$189,693	D. $45,182
Mileage	1 425	1,422	I. 3
Two Months, Jan. 1 to Feb. 29:			
Gross earnings	$837,205	$1,177,304	D. $240,099
Oper. expenses	640,522	694,279	D. 53,727
Surplus	$269,653	$483,025	D. $186,372

UNION PACIFIC, DENVER & GULF.

Month of February:			
Gross earnings	$391,906	$371,057	I. $20,849
Oper. expenses	337,616	335,550	I. 2,1 6
Surplus	$54,290	$35,557	I. $18,733
Mileage	1,463	1,452	I.
Jan. 1 to Feb. 29:			
Gross earnings	$834,950	$760,117	I. $74,833
Oper expenses	697,289	651,723	I. 45,566
Surplus	$137,661	$108,394	I. $29,267

UNION PACIFIC SYSTEM PROPER.

Month of February:			
Gross earnings	$2,782,111	$2,682,218	I. $99,893
Operating expenses	2,001,368	1,995,832	I. 5,536
Surplus	$780,743	$686,386	I. $94,357
Mileage	7,672	7,668	I. 4
Jan. 1 to Feb. 29:			
Gross earnings	$5,832,579	$5,708,(10	I. $124,569
Operating expenses	4,114,788	4,028,967	I. 85,821
Surplus	$1,717,791	$1,679,043	I. $38,748

GRAND TOTAL OF UNION PACIFIC SYSTEM.

Month of February:			
Gross earnings	$2,926,414	$2,779,023	I. $147,391
Oper. expenses	2,099,531	2,075,514	I. 24,017
Surplus	$826,883	$703 509	I. $123,374
Mileage	8,148	8,144	I. 4
Jan. 1 to Feb. 29.			
Gross earnings	$6,140,542	$5,894,400	I. $246,142
Oper. expenses	4,314,331	4,207,383	I. 106,948
Surplus	$1,826,211	$1,687,017	I. $139,194

TRAFFIC.

Chicago Traffic Matters.

CHICAGO, April 20, 1892.

The Southwestern Railway & Steamship Association completed its meeting in this city April 15. But little business was done aside from discussing plans for the future of the association, and the meeting adjourned to reconvene here May 25. A meeting of the Executive Board will be held in New York May 11, the day following the meeting of the Advisory Board of the Western Traffic Association, to consider a new form of agreement and prepare a report to be submitted to the meeting on May 25. The legal representatives of the lines will in the meantime hold a conference and examine the legal aspect of the new agreement. No change will be made in the workings of the present association before the next meeting.

It is now probable that the meeting of the Advisory Board of the Western Traffic Association called for May 10 will have a quorum and will be able to take up the large amount of business which has accumulated since the last meeting. The Commissioners have referred a number of new cases, and there are several appeals which have been taken from decisions of the Commissioners which must be heard; notably the appeal of the Atchison, Topeka & Santa Fe in the matter of a reduction in second-class passenger rates to Pacific coast points and the appeals of the Rock Island & Burlington in regard to rates on ore and bullion from Colorado points to the Missouri River. Those most conversant with the affairs of the Association express the opinion that there will be no serious friction at the meeting, notwithstanding the various knotty questions which will come up for action.

The Chicago & Northwestern, contrary to expectations, has withdrawn its advanced switching charge of $3 per car on grain and has restored the former tariff of $1 per car. It appears that the $1 rate was established by agreement with the Chicago Freight Bureau.

The Central Traffic Association meeting here last week was unusually spicy. Charges were freely made that eastbound grain rates were being cut nearly one-third, and several lines offered resolutions proposing open reduced rates to meet the secret rates, but they were voted down. The usual amount of routine business was transacted, and finally a sub-committee was appointed to investigate the charges of cutting and report at the next meeting. It is understood that the Vanderbilt lines oppose any reductions and probably the "investigation" will result as many similar ones have in the past. The application of the Boston & Albany for a reduction in eastbound rates to Boston and New England points was referred to a general meeting to be held in New York this week.

The lake lines and the Chicago-St. Paul rail lines have agreed upon the following rates for the current season: From Chicago and Milwaukee via the lake lines to Duluth on business destined to Montana and other Western territory, same as the local rates to Duluth, viz.:

1	2	3	4	5
45	35	25	18	14

These rates give the lake lines the following differentials on this business:

1	2	3	4	5
15	15	15	7	6

Suits aggregating $450,000 have been instituted by Geo. H. Hammond & Co. against various railroad companies for alleged excessive freight charges under the interstate commerce law.

The Chicago *Tribune* on Saturday last published nine columns of evidence, more or less direct, of violations of the Interstate Commerce Law, headed "Laugh at the Law." The substance of the article consists of a large number of claim vouchers, letters, etc., showing payments by the New York, Lake Erie & Western and other roads for lighterage, commissions, etc. The documents referring to the Erie purport to be extracts from the claim books of that road showing allowances paid various firms for "lighterage" on shipments billed from Chicago to New York and stopped at Jersey City. A fac simile of a letter from A. B. Thompson, Freight Claim Agent of the Delaware, Lackawanna & Western, dated New York, Jan. 7, 1892, is published, reading as follows:

R. S. Robertson, Esq., G. E. F. A., City:

DEAR SIR: "Referring to claim presented by you, account of J. V. Farwell and Ely, Walker & Co., am I to understand that Farwell's voucher is to be made out in favor of William Lawyer for $6,618, and is to be paid through you, and you will arrange to get Lawyer's signature, and that Ely, Walker & Co.'s voucher is to be made up in their favor? I will make voucher 'account services rendered,' will this be satisfactory to you; inasmuch as I must use some phrase in order to come within the Interstate law."

The *Tribune* states that it has in its possession either the original documents, photographic copies of the original documents, or copies, to the correctness of which affidavit will be made, showing the payment of the rebate of $6,618 to J. V. Farwell & Co., by the Delaware, Lackawanna & Western; the payment of large rebates by the same line to Swift & Co. through A. R. Fay; the granting of a rebate by the West Shore of one cent per 100 lbs. on large shipments of marble from Rutland, Vt., to Philadelphia; the payment of fictitious lighterage charges to Messrs. Armour, Swift & Co., Nelson Morris & Co., the Standard Oil Co., and others; special rates over the Rome, Watertown & Ogdensburg and Canadian Pacific on shipments of paper from Saugerties to Minneapolis and St. Paul; extensive cuts made by the New York Central by means of underbilling in weights, etc., as well as numerous other manipulations by various lines.

Traffic Notes.

The merchants of Erie, Pa., have organized a traffic association, of which M. N. Lovell is President.

Special Agent Kretschmer, of the Interstate Commerce Commission, is in Omaha and tells the reporters that he is going to present important cases to the Grand Jury there.

The Denver Knights Templar say that the Southern Pacific has agreed to give half rates from Pacific Coast points to Denver on the occasion of the conclave this summer. It has been several times reported that the road refused to make this reduction.

The West Shore road has reduced its commutation rates to and from New York City and has adopted the plan of selling monthly tickets at a uniform rate, instead of charging higher for the first months of the year and lower for the last months, as heretofore.

The lines interested in freight from northern and central New York State to St. Paul via Chicago have been holding protracted conferences with the Canadian Pacific with a view to reaching an agreement on rates. It is claimed that under the present circumstances the Canadian Pacific gets more than its share of the shipments.

The North Pacific Coast Railroad, without any direction from any quarter (and particularly from the Railroad Commissioners) has ordered a horizontal reduction of all tariffs for the purpose of increasing the business of the road. The freight schedule went into effect on April 1, and is equal to 20 per cent.—*San Francisco Paper.*

Freight rates from St. Louis to the City of Mexico have been reduced, a new tariff issued April 9 showing first class, $2.50; second, $2.25; third, $2.05; fourth, $1.90; fifth, $1.60; class A, $1.63; B, $1.45; C, $1.25; D, $1.10; E. $1. It is said that an increasing amount of freight has gone via New York City and thence by water via Mobile and by steamer from there to Tampico; and the direct rates have been reduced to meet this competition.

The Inter-State Commerce Commission.

The Commission in an opinion by Commissioner Knapp, has announced its decision in the cases of George Rice against the Louisville & Nashville, the Cincinnati, Washington & Baltimore and others, forming two different routes to the Pacific coast from complainant's oil refinery at Marietta, O. The decision is in favor of complainant. The cases involved rates on petroleum to the Pacific coast and points on the Louisville & Nashville; also of unlawful discrimination by the tank-car method against complainant and others who ship in barrels. It is held that in assuming that a barrel of refined oil weighs 400 lbs. and that a gallon weighs 6.3 lbs. when shipped in tanks, defendants use constructive weights so much out of proportion to actual weights that positive preference is constantly granted to the shipper of the tank method, and, so far as that practice enables the tank shipper to secure the carriage of more pounds of freight for the same money than the shipper in barrels, it subjects the latter to unlawful prejudice. When actual weights cannot be ascertained without needless inconvenience there is no serious objection to the use of estimated or constructive weights, provided the method of estimation works no inequality in its practical application to competing modes of conveyance.

The practice of allowing the tank shipper an arbitrary deduction of 42 gallons per tank is wholly indefensible. Losses from leakage and evaporation are not less proportional when the shipment is made in barrels, and no reason is advanced which justifies a concession of that nature to the shipper who furnishes his own conveyance, when no corresponding allowance is made to a rival shipper using the means of transportation provided by the carrier. The charges of the Louisville & Nashville to several points on its lines are not only apparently unreasonable in themselves, but the existing disparity in rates to neighboring localities creates presumption of extortion in exacting the higher charges. This defendant is ordered to revise and correct its charges on petroleum to many interior and local points on its lines, and will make such reductions and modifications therein as will remove the gross disproportions and inequalities now found to exist.

The cases against the other defendants are held open for further evidence and argument in regard to the reasonableness of rates on petroleum products to the Pacific coast from points east of the ninety-seventh meridian.

Lake Soft Coal Shipments.

The shipments of soft coal from Lake Erie ports for 1891 amounted to 3,152,756 tons, a gain of 44,940 tons over the shipments of 1890. Of the total, 1,848,983 tons was Ohio coal, 1,152,948 Pennsylvania, and 150,825 tons West Virginia coal. A little over one million tons was shipped from Cleveland, and a little less than that from Toledo. During the same time Buffalo shipped 2,358,895 tons of anthracite, Chicago taking nearly a million tons, and Detroit and Superior 420,700 tons, against 508,140 to Milwaukee.

Eastbound Shipments.

The shipments of eastbound freight from Chicago by all the roads for the week ending April 16 amounted to 80,062 tons, against 89,878 for the preceding week, a decrease of 9,816 tons, and against 67,086 for the corresponding week last year, an increase of 12,976 tons. The Chicago & Grand Trunk headed the list last week with 13,799 tons, the Michigan Central following with 13,357 tons, and the Chicago & Erie with 11,337 tons. Both the Wabash and the Big Four made a better showing than the Lake Shore, which fell back to fifth place.

GEO. WESTINGHOUSE, JR., President. T. W. WELSH, Supt. JOHN CALDWELL, Treasurer. W. W. CARD, Secretary. H. H. WESTINGHOUSE, General Manager.

THE WESTINGHOUSE AIR BRAKE COMPANY

PITTSBURGH, PA., U. S. A.,

MANUFACTURERS OF THE

WESTINGHOUSE AUTOMATIC BRAKE

The WESTINGHOUSE AUTOMATIC BRAKE is now in use on 24,000 engines and 292,000 cars. This includes (with plain brakes) 200,000 freight cars, which is about 20 PER CENT. of the Entire Freight Car Equipment of this country, and about 80 per cent. of these are engaged in interstate traffic, affording an opportunity of controlling the speed of trains by their use on railways over which they may pass. Orders have been received for 140,000 of the Improved Quick-Action Brakes since December, 1887.

The best results are obtained in freight train braking from having all the cars in a train fitted with power brakes, but several years' experience has proven conclusively that brakes can be successfully and profitably used on freight trains where but a portion of the cars are so equipped. Below is a graphical illustration of the progress made in the application of the Automatic Brake to freight cars since its inception

Year.	No. per year.	Grand total.
1881	105	105
1882	1,085	1,190
1883	4,966	6,156
1884	15,051	21,207
1885	10,410	31,617
1886	8,946	40,563
1887	9,281	49,844
1888	27,696	77,540
1889	26,065	103,605
1890	50,502	154,107
1891	39,061	193,168

193,168 freight cars fitted with the Westinghouse Automatic Brake, which is nearly 20 per cent. of the Entire Freight Car Equipment of this country.

E. L. ADREON, Manager. JOHN B. GRAY, Agent. C. C. HIGHAM, General Supt.

THE

AMERICAN BRAKE COMPANY.

NEW YORK OFFICE, 160 Broadway, JOHN B. GRAY, Agent.

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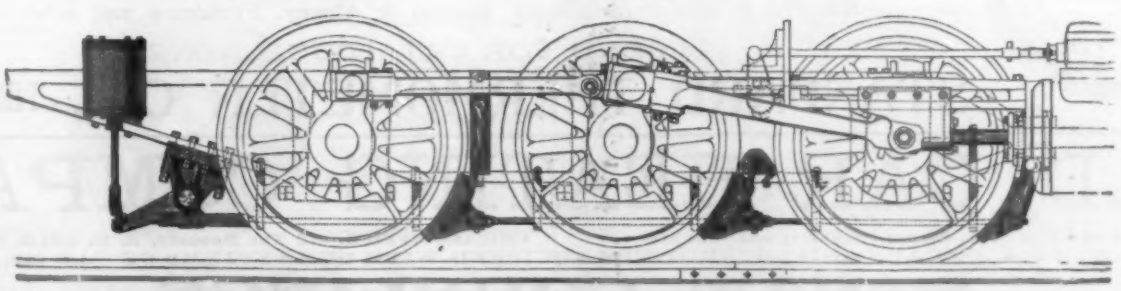
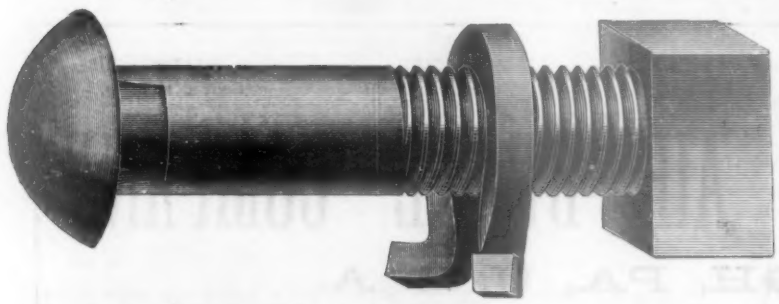


Standard Outside Equalized Pressure Brake, for two or more pairs of Drivers, furnished to operate with either STEAM, AIR or VACUUM.

THE "STANDARD" NUT LOCK



Manufactured under D. O. Ward's Patents by the

STANDARD NUT LOCK CO.,

NOS. 236-248 BANK ST., NEWARK, N. J.

SAMPLES FREE.

This nut lock is presented on its merits as the best and cheapest device for securing track joints.

It is a torsional loop made of good quality of tempered spring steel, having horizontally inclined foot pieces, which are curved inward, thereby greatly increasing the spring resistance and acting simultaneously: rests upon the base of angle bar, or underlying rail base in case of fish plate, preventing the loop portion from rotating and hammering down *thread of bolt*.

The nut lock for ¾ bolt made of ½ in. square steel, standard pattern, yields a tension of 4,300 lbs. on the bolt, which is sufficient to reduce the wear of the bearing surfaces of the angle bars on the rails, imparting, as it does, a uniform bearing the entire length of the bar.

The "Standard" Nut Lock has sufficient elasticity to maintain a tight joint, which cannot be truthfully said of many light-weight single coil washers.

The "Standard" Nut Lock is, in its superficial form, similar to an annular coil twisted out of plain, *i. e.*, the curved shoulders or ends of the loop proper are spread in the usual manner of spring coils, at which bearing points the locking friction is equal to that of the best single coil washer, and added to this it is terminated in *inwardly curved* extensions, which must apparently furnish additional short leverage spring force of a torsional character.

Distinctive Merits of the "Standard" Nut Lock, Condensed:

Fixedness of position—cannot rotate and hammer down threads of bolt.

Cannot get one end into elongated slot of angle-bar.

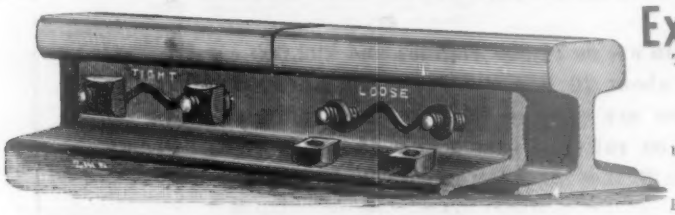
Unlike any permanently placed, double washer, the Standard *is* interchangeable regardless of distance between bolts.

Cannot be put on wrong side out, as the outward projection of the foot pieces would prevent the nut being turned up.

Has more spring power directly under the nut than any two ordinary coil nut locks.

Being fixed in position it offers double the locking friction of nut locks, which when in their *dead* "set" condition turn back with nut by the vibrative effect of passing train.

The "Standard" Nut Lock embodies the old principle of spring power improved by overcoming the objection to the double washer or nut lock, and covering the weak points of the single coil washer.



Excelsior Automatic Nut-Lock and Fish Plate Spring

These Nut Locks have been adopted by the New England Road-Masters, in Conventions held at Hartford, Conn., Oct. 19 and 20, 1887, and Boston, Mass., Aug. 15 and 16, 1888, as the best Nut Locks known.

Sample lots furnished for trial, free of expense, by forwarding the distance between centres of fish-plate bolts. Correspondence and orders solicited.

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For Use on All Kinds and Classes of Work.

Made for all sizes of bolts.

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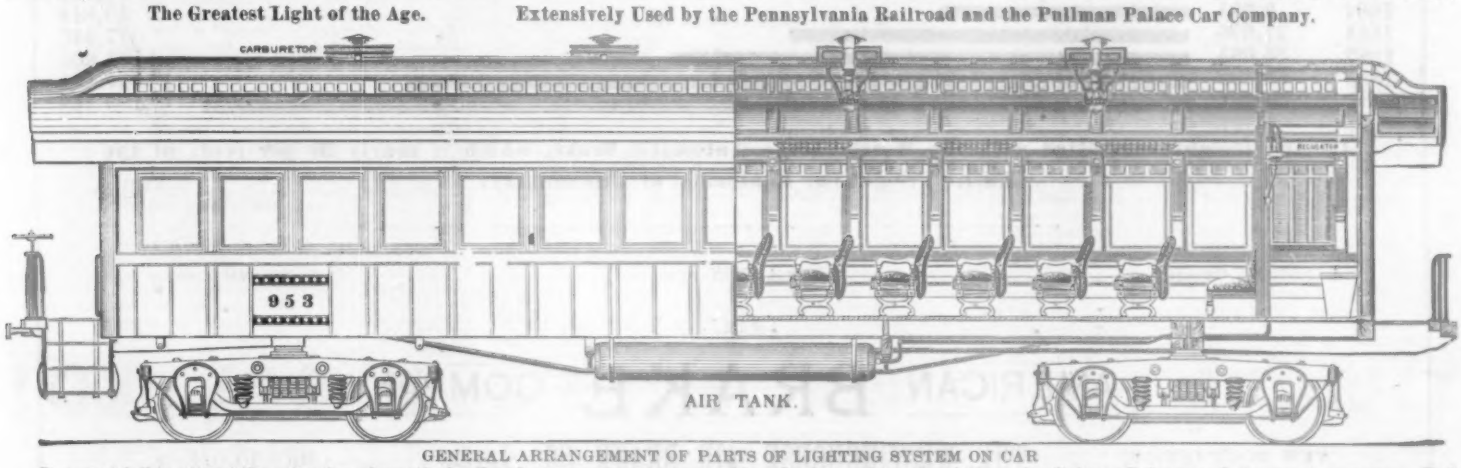
The Greatest Light of the Age. Extensively Used by the Pennsylvania Railroad and the Pullman Palace Car Company.



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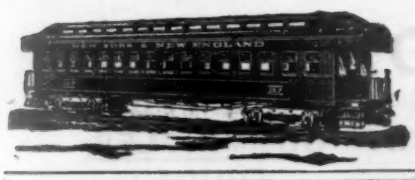

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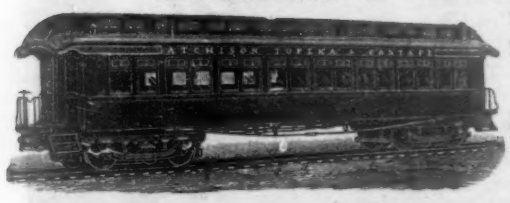

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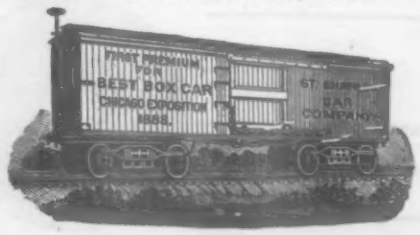

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Balt. & Ohio	118	Richm. & Danv.	20	Cent. R. R. of N. J.	58	N. Y. & New Eng.	72	Old Colony R. R.	46	Long Island R. R.	23
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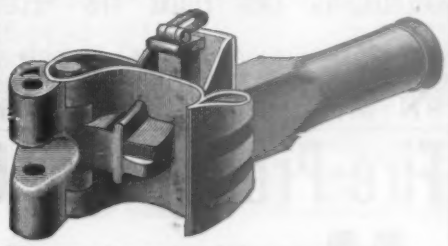

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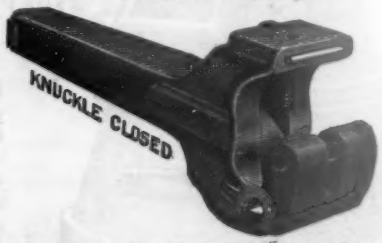

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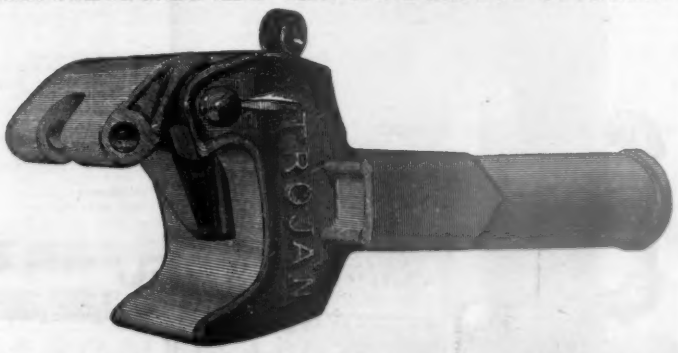

The knuckle may be thrown open for coupling by the hand-rod at the side of the car, rendering it unnecessary for trainmen to go between the cars to open the knuckle. The action is positive, and not dependent on springs or gravity.

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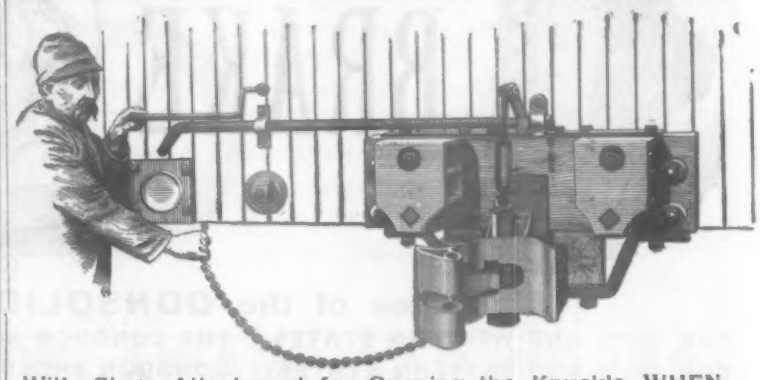
Drawhead, Malleable Iron; Knuckle, Pressed Steel; Pin, Drop Forged Steel.



With Chain Attachment for Opening the Knuckle WHEN REQUIRED.

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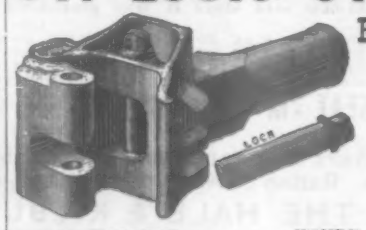

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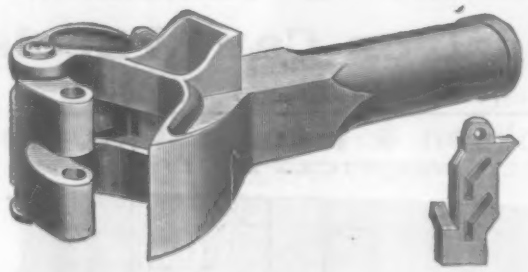

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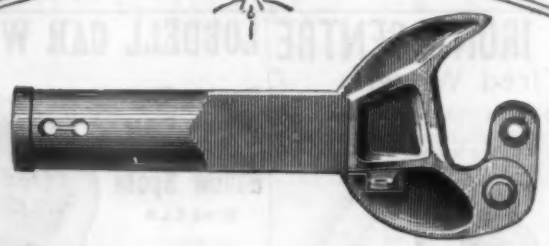

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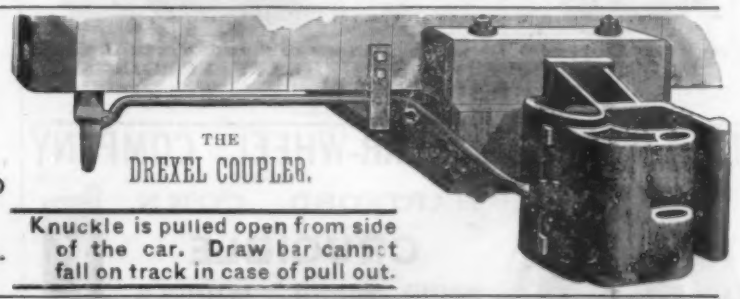

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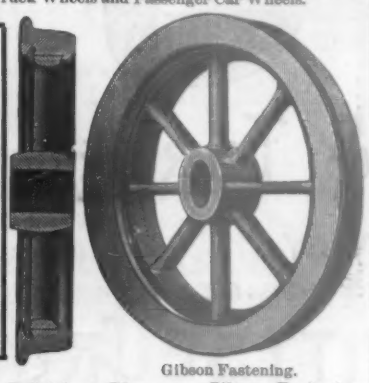

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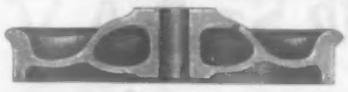

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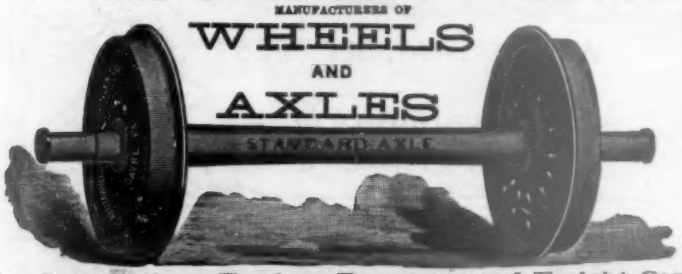

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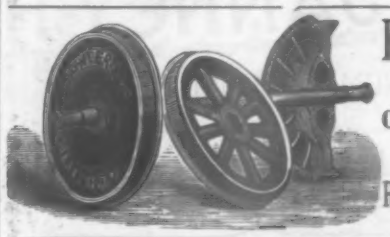

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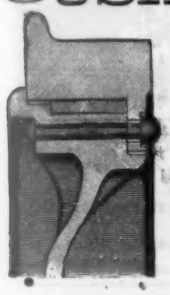

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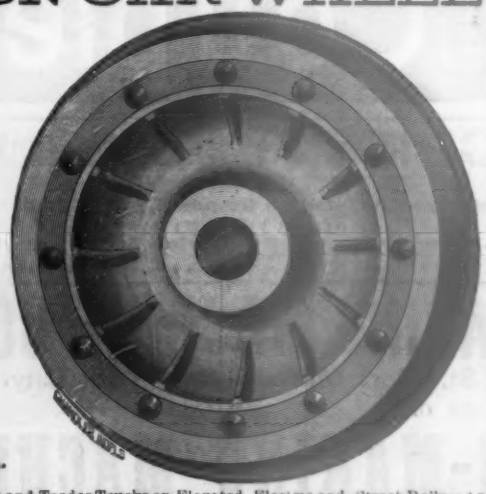

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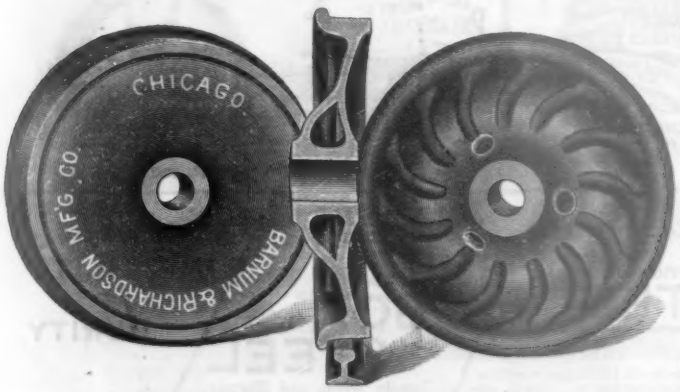

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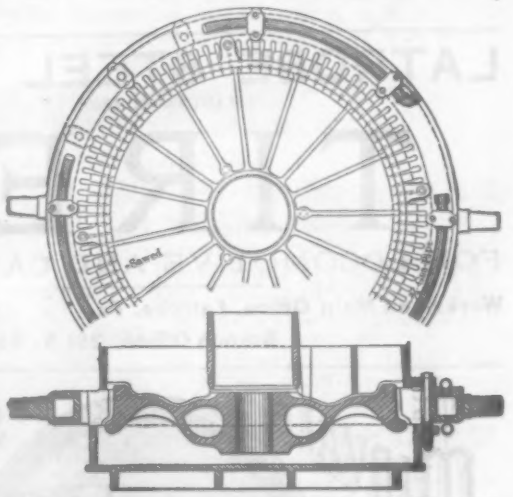

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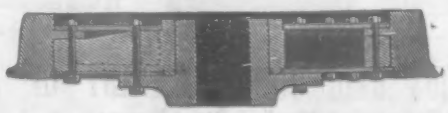

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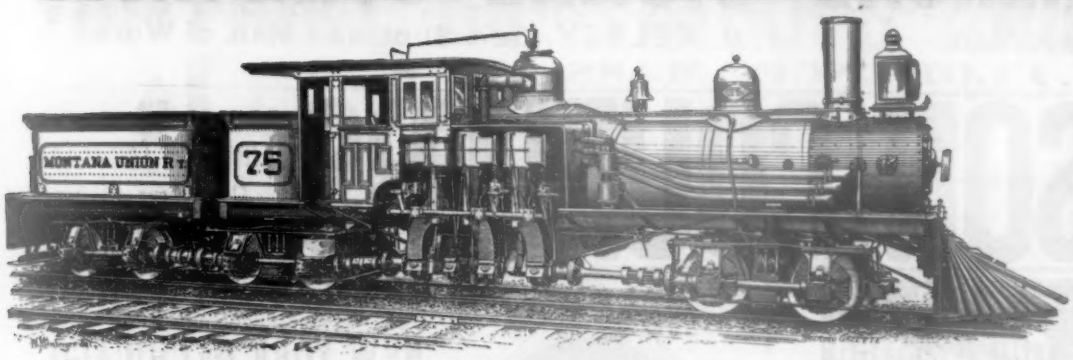

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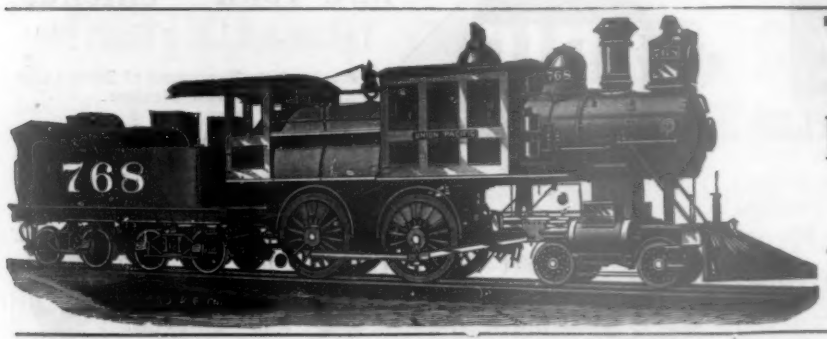

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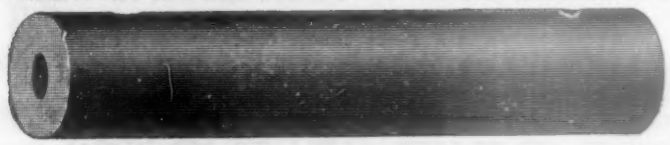

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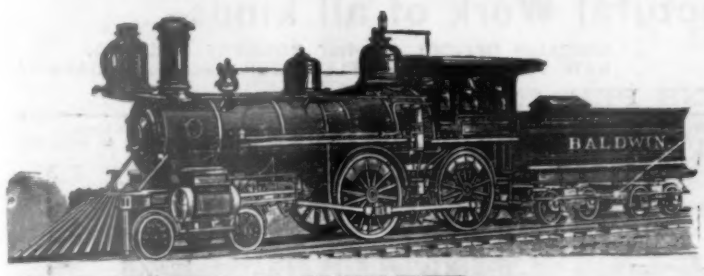

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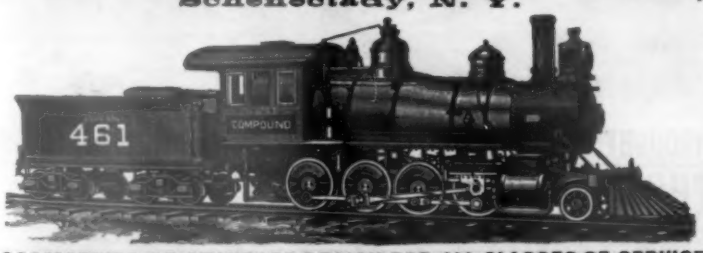

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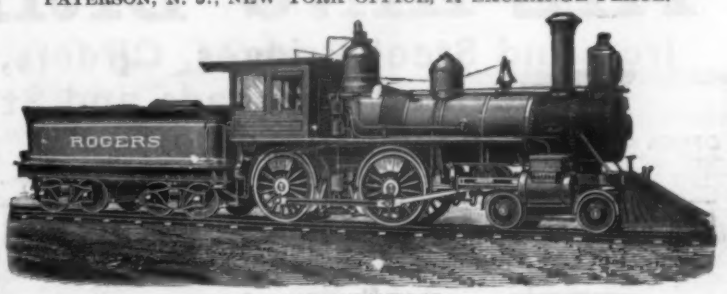

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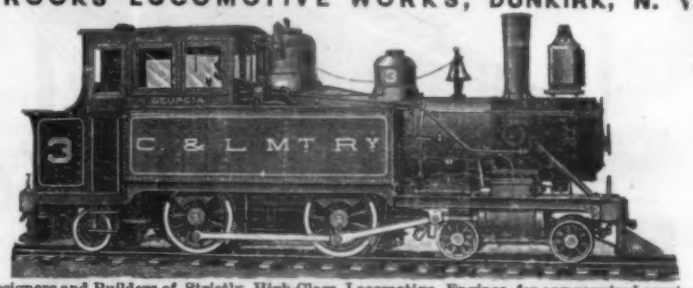

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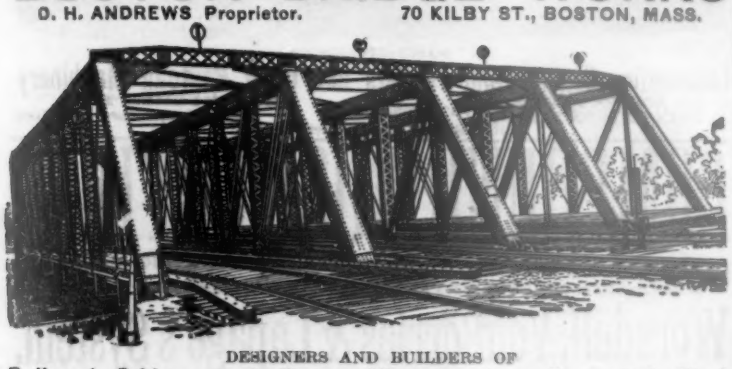

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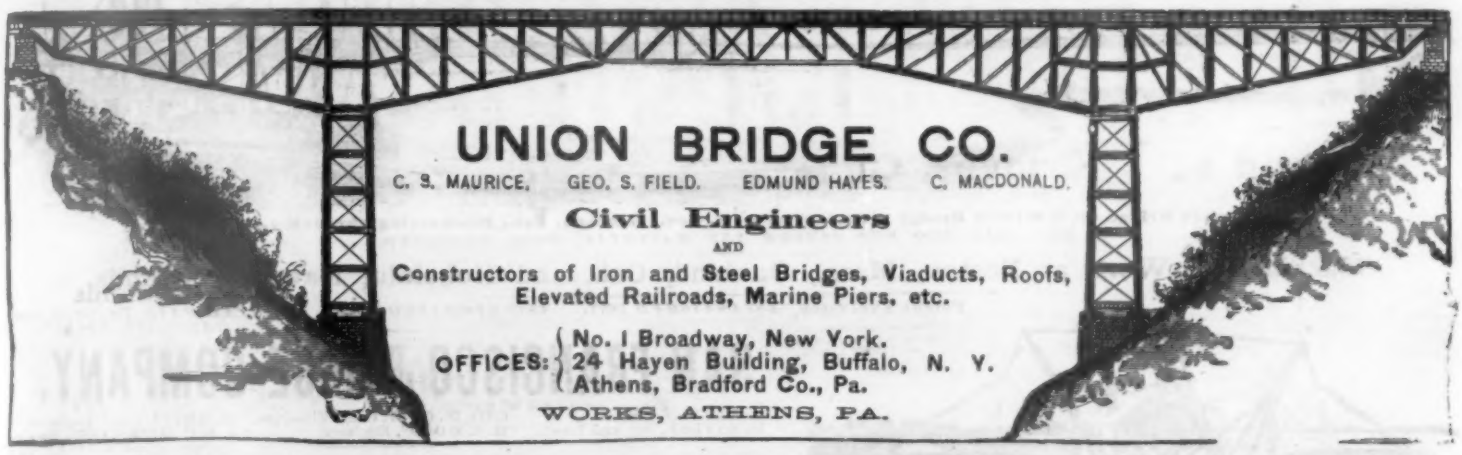

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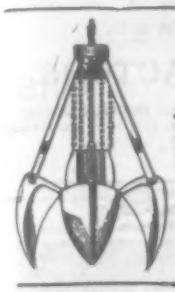

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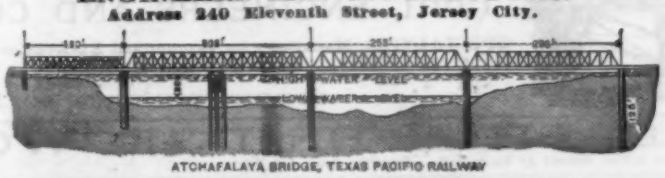

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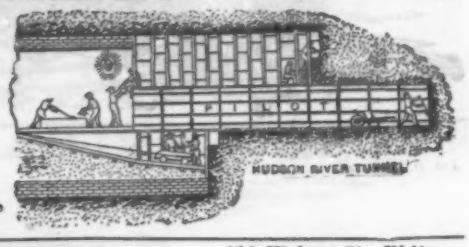

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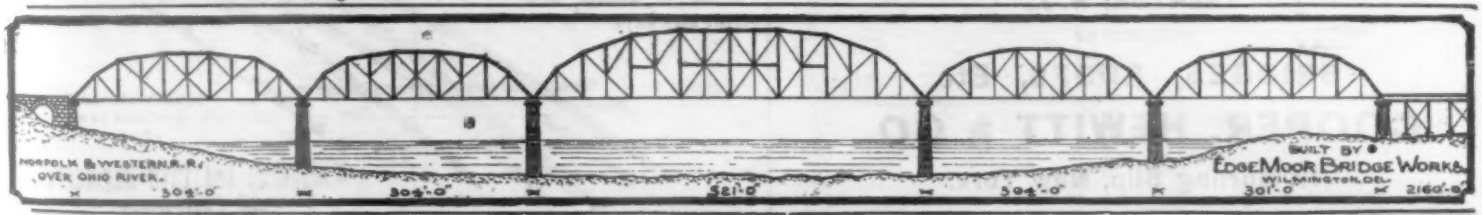

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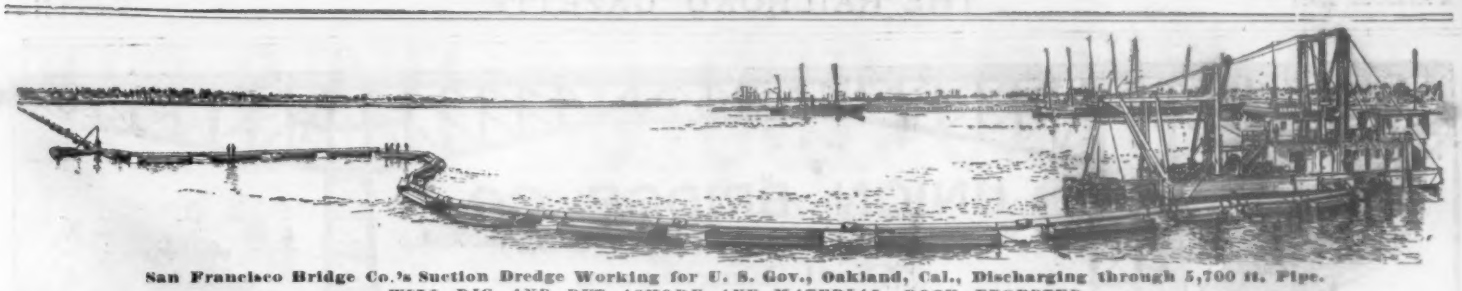

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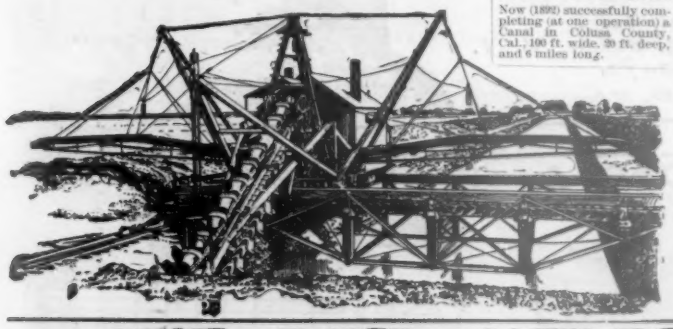

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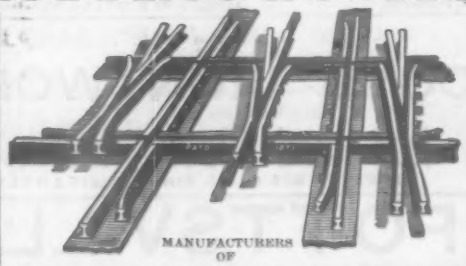

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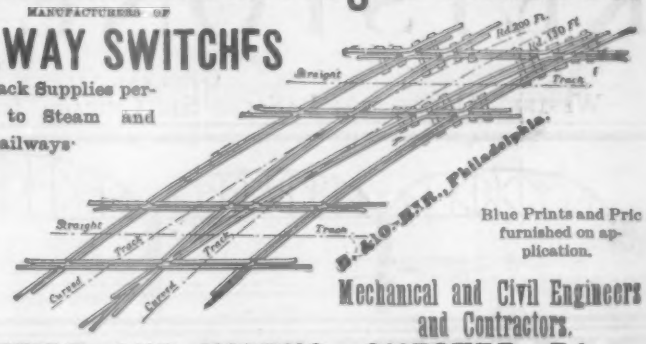

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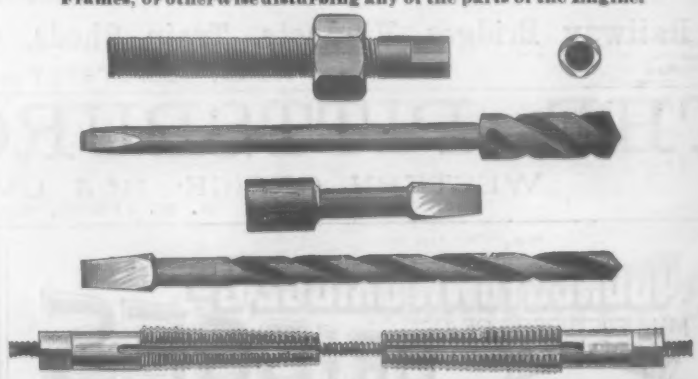

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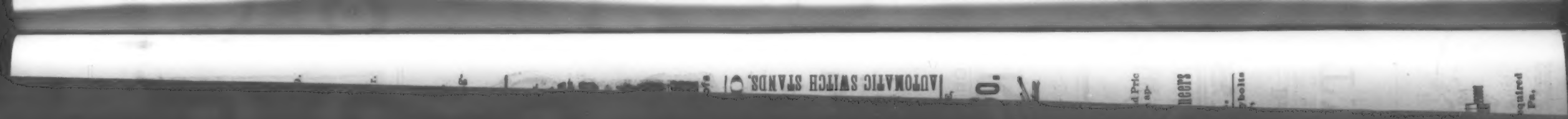
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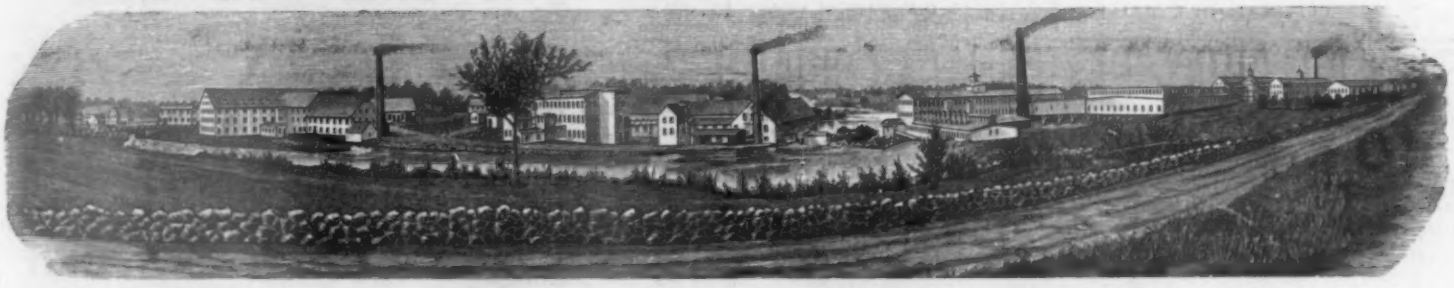

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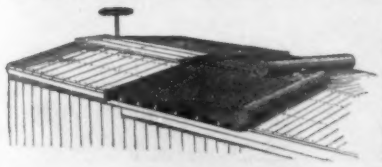
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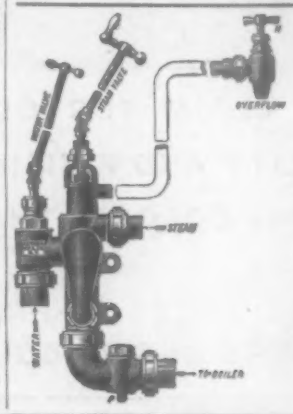

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